VICTORY GARDENS

Handbook of the

VICTORY GARDEN COMMITTEE
WAR SERVICES, PENNSYLVANIA
STATE COUNCIL OF DEFENSE

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HANDBOOK OF THE VICTORY GARDEN COMMITTEE, WAR SERVICES, PENNSYLVANIA STATE COUNCIL OF DEFENSE

FOREWORD—GOVERNOR EDWARD MARTIN
Chairman, Pennsylvania State Council of Defense

INTRODUCTION—MARION MARGERY SCRANTON
Commander, War Services, Pennsylvania State Council of Defense

with text material

by

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Foreword

Pennsylvania's Victory Gardeners have been given the job this year of helping to support the greatest invasion in history, by planting at least 1,540,000 gardens—a 10 per cent. increase over last year. The 1943 gardens in the Commonwealth, numbering approximately 1,400,000, represented a 100 per cent. increase over the 1942 total.

The 1944 total number of Victory Gardens for Pennsylvania was agreed by members of the State Council of Defense Victory Garden Committee at a meeting in the Capitol on February tenth to represent a goal which can be achieved. Anything less than this number will not be enough.

Food, without question, is the strongest weapon of war. Armies and those who supply them can not progress far without food. We must plant more gardens, and enlarge our activities in every field of agriculture, in order to support our armies abroad. Every pound of food raised at home releases this much food to our armed forces.

We must also have increased canning, and other forms of home conservation as a wartime measure.

The State Council of Defense will assist civilians in every way possible during the current year, so that our civilians will be adequately fed, and so that some of the burden of civilian feeding will be removed from the shoulders of commercial food producers while they are engaged in feeding the greatest army of all times.

Governor of the
Commonwealth of Pennsylvania

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INTRODUCTION

Marion Margery Scranton,
Commander, War Services,
Pennsylvania State Council of Defense

The Victory Garden movement and its significance in our wartime economy, both as a means of releasing food to our armed forces and of improving the nutritional status of civilians can be appreciated only by those who study the statistics and translate them into homely, every-day meaning. When we hear that Americans produced eight million tons of vegetables last year in home gardens, a quantity which was one-fourth of the entire vegetable production of the nation, it can be seen readily what would have been the state of civilian nutrition if the Victory Garden had not functioned.

As a means of increasing our nation's food supply, both fresh and canned or otherwise conserved for winter use, the Victory Garden has more than justified itself. Not only have people had more food as a result of this home effort, but also they have learned lessons of food selection and preparation, of food values, of human nutrition and its dependence upon proper food selection, which would never have been taught so well in any other way. Millions of dollars of advertising by commercial firms could never have been so effective in teaching the consumer the value of vegetables in the dietary as has the wartime experience of home vegetable production.

The War Services of The Pennsylvania State Council of Defense is proud of its Victory Garden Program and its accomplishments. By conservative estimates based upon surveys by Council of Defense Block Leaders, Boy Scouts, Victory Garden Committees, and other agencies the number of Pennsylvania gardens for 1943 was found to be approximately 1,400,000 gardens. This doubled the number of home gardens grown in 1942, which in turn represented a considerable increase both in number and size of gardens which pertained during the period immediately preceding the present world conflict.

Governor Edward Martin has asked for a 10 per cent. increase in the number of Pennsylvania home gardens for 1944, or a total of 1,540,000 Victory Gardens. The 1500 functioning Victory Garden Committees of the State Council of Defense throughout the Commonwealth of Pennsylvania are pledged to reach or exceed this quota.

The State Council of Defense offers all possible help to civilians on what to plant to add to the nutritional well-being of families of all sizes and compositions. Through co-operation with the various state agencies, notably the Department of Agriculture of the Commonwealth and The Pennsylvania State College, the latter with its County Farm Agents in every county, as well as other horticul-

tural groups, civilians are given whatever technical information they may desire in selecting garden sites, testing soil, selecting seeds, and in cultural methods.

As the season progresses, the home gardener is assisted in canning, or otherwise conserving whatever his garden offers over and above that which may be eaten fresh. If the housewife does not have the home facilities or experience for proper home preservation of her Victory Garden produce, the Pennsylvania State Council of Defense offers the use of its Victory Garden Conservation Kitchens, scattered throughout the state.

Surpluses in excess of family needs are canned for civic purposes—the local hospital, and school lunch, and food banks.

An example of the democratic functioning of a local Victory Garden Committee may be found in a recent report made by Mrs. Alexander J. Barron, Victory Garden Chairman for Allegheny County, in which Pittsburgh is located. The report, in part, follows:

"Supervisors were appointed not only for all of the large plots which contained possibly 65 or 70 gardens, but for smaller plots also. And these men and women proved of great assistance in staking out gardens after plowing had been done, giving friendly advice throughout the summer, occasionally prodding lazy gardeners, and in the fall reporting on any neglected plots. Supervisors, of whom there were about 46, were called together occasionally during the summer and fall to discuss problems common to all, and it is to many of them, who gave us wonderful help in 1943, that we shall turn this year for continued support.

"A downtown office in a room adjoining that of the County Extension Service was maintained for several months in the spring, and members of our committee gave assistance in **testing soil** and serving as an **information bureau.** Gardens were given out directly by the committees under this office. A special effort was made to care for settlement and housing groups.

"Victory Garden chairmen were appointed throughout the county in each municipality, suburb, and township, and were given help and advice as needed, although each local chairman was encouraged to handle his problems as he thought best. Of course, in rural sections everyone had his own farm or garden. But in industrial centers like McKeesport, Duquesne, and in Wilkinsburg, at the edge of the city, outstanding Victory Garden programs were developed, as was the case in some suburbs like Mt. Lebanon and Sewickley. Many of the large industrial companies, including Westinghouse, Carnegie Illinois, the Lewis Foundry, Pittsburgh Coke & Iron, Hagen Corporation, Homestead Steel, Allis-Chalmers, and Gulf Research Laboratory, had large plots for employees and gave prizes at the end of the

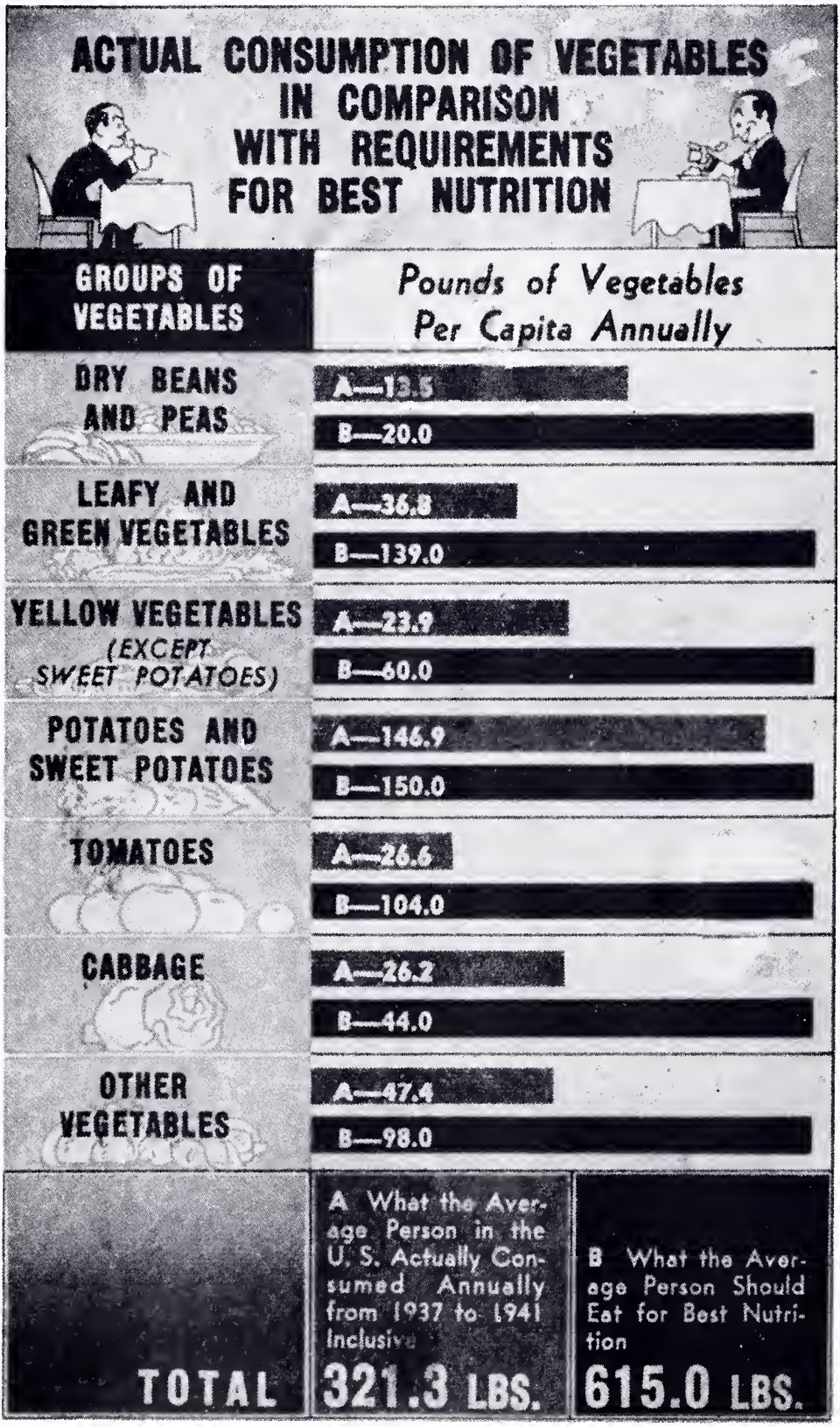
year. It has been impossible to make an accurate census of all the Victory Gardens in Allegheny County, but we estimate that in 1943 there were at least 300,000.

"'Perhaps of even greater value than the amount of food raised was the friendliness and breaking down of class distinctions among those working in some of the large allotment plots. In one plot, for instance, there was to be found an unusually interesting cross section of American life, including seven doctors (one a woman), two dentists, several lawyers, a college professor, a research man from the Mellon Institute, the president of one of Pittsburgh's largest utility companies, a member of the Stock Exchange, a councilman, a man in the City Water Bureau, a street car conductor, a newspaper man, two Negro families, one Czech family, several mill workers, white collar workers, housewives, and garden club members.

"A canning chairman was appointed under each Victory Garden chairman throughout the county and was urged to make a survey of the needs of her community and to let this office help her arrange for demonstrations by trained domestic science teachers, if necessary. The committee co-operated with the Red Cross, the city and county schools, the Agricultural Extension Service, and commercial companies who sent out their own teachers.

"Under the Board of Education, the home economics supervisors arranged for 26 demonstrations to be given in the public schools of the city. Nine demonstrations in canning, dehydrating, and freezing were held at the Pittsburgh Garden Center. The committee also arranged for canning lessons at five different settlement houses and eleven of the housing projects. Regular canning sessions were held at the Woods Run Settlement Home eight different days, as well as four demonstrations, the women of the community bringing their own produce and canning it for their own use. Under the county schools there were domestic science teachers working constantly in several districts, among them West Deer and Mifflin Townships. One especially interesting canning center was held at the Liberty School where surplus produce was brought in and canned under a trained teacher. Miss Isabelle Bewick of the Agricultural Extension Service gave 74 separate demonstrations in different parts of the county and reached 2388 people.

"The committee encouraged canning projects in Sewickley where women canned vegetables that were donated to the Sewickley Valley Hospital for hospital use, and in Kennedy Township, where a group of women canned over 3000 quarts of vegetables and fruit for the Ohio Valley Hospital. We feel that the teaching of canning and dehydrating was so readily available throughout the county that anyone who wished to learn had opportunity to do so."



—*Courtesy The Philadelphia Inquirer. Chart drawn to illustrate a Victory Garden article by Warren Mack in Everybody's Weekly, in the Sunday Philadelphia Inquirer.*

VICTORY GARDENS ARE NEEDED

Warren B. Mack,[1] Executive Secretary, Advisory Victory Garden Committee, War Services, Pennsylvania State Council of Defense

Americans in 1943 produced more than 24 million tons of vegetables for sale, including potatoes, in market gardens and on farms, and an estimated eight million tons of vegetables for family use, in home gardens. Commercial production, though a very little less than in 1942, was greater than in any season before the outbreak of the war; the yields from Victory Gardens raised the total vegetable supply of the American people far above any previous record. The home production of vegetables for family use probably was 50 per cent. above that in any previous season, except possibly in 1919, the first year after World War I.

This accomplishment in food production, in spite of unfavorable weather in several important areas, and of loss of experienced workers from farms, has improved the national morale greatly. It has convinced most people that no threat exists of a serious reduction in the nation's civilian food supply. Many are optimistic that it is possible to improve still further the nutrition of our population, in the face of war's demands for food, material, and labor.

Public officials share in this optimism. "The splendid job done by housewives last summer in home canning," stated one federal administrator in a recent press release, "enabled OPA to take certain items off the ration list last month. If this work continues and the canners do not get the 'peace jitters,' thereby cutting down their production, the possibility of taking processed foods off rationing by next fall is good."

No Grounds for Complacency

Even if our citizens do not relax in their home and commercial food production, however, we are not justified in becoming complacent about our accomplishments. It is not enough to boast that we are the best fed nation on earth. Such a comparison serves no good purpose; with Belgium, Greece, China, India, and Poland standing to lose from one-fifth to one-half of their entire populations during the course of the war from starvation or disease consequent on malnutrition, the base of reference is so low as to make it meaningless. We must judge our need for greater production from the extent to which we can improve our own nutrition through greater and more varied supplies of foods which we can produce.

Americans never have consumed enough vegetables and fruits for their best nutrition. Even at its greatest, the vegetable supply of our

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civilian population was not more than half of the amount needed to supply adequate quantities of the nutrients—minerals and vitamins for which these foods are distinguished, as judged from present recommendations.

Americans Traditionally Use Too Few Vegetables

As to vegetables, colonial writings include some references to turnips, peas, and beans; but only the last two were grown chiefly for human consumption, for which both were matured and dried. Of the native American vegetables grown and used freely by Indians, beans apparently were adopted directly by English colonists, and these came into general use in a short time; squashes and potatoes were grown generally in Europe about as soon as they were in America; tomatoes were introduced to the northern colonists by the French settlers in the southern part of the country as early as 1750 but were not accepted generally until after 1835. Sweet corn is about the only one exclusively adopted by Americans; they obtained field corn from the Indians, and there is evidence that sweet corn appeared as a natural variant in a Yankee cornfield.

Part View of Eighty Community Victory Gardens at Seneca, Pennsylvania, Sponsored by the Oil City Victory Garden Committee

The attitude of the early American toward vegetable production is inferred very bluntly by William Cobbett, in the preface to his book, "The American Gardener," written in 1819: "The object [of the book] evidently is to cause the art of gardening to be better understood and practiced than it now is in America; and, very few persons will deny, that there is, in this case, plenty of room for improvement. America has soil and climate far surpassing those of England, and yet she is surprisingly deficient in variety as well as quality of garden products. I am not alluding to things of ornament, or appertaining to luxurious enjoyments, but to things that are really useful, and that tend to profit and to the preservation of health, without which latter, life is not worth having."

Vegetables for sale, other than potatoes, were recorded in the census of the United States for the first time in 1850, when the farm value of the commercial crop in the United States was stated as a little over five million dollars. For a population of 23 millions, this represents an annual commercial production of less than 25 cents worth for each person.

Fifty years later, in 1900, the total value of vegetables grown for sale, other than potatoes and sweet potatoes, was reported to be $74,000,000 and that of vegetables grown on farms for home use was $46,500,000. Potatoes and sweet potatoes brought the farm value of all vegetables to $242,200,000 or an annual value of $3.19 per person for a population of 76 millions; for vegetables other than potatoes, the value per person was half as much, or $1.59.

The average annual consumption of fresh vegetables, including potatoes and sweet potatoes, per person during the five years from 1937 to 1941 inclusive, was 298.9 pounds, with a farm value of slightly over $3.11. This relatively small value, in comparison with 1900, was due to the lower prices of vegetables in the later years; it represents a return to commercial vegetable growers of less than one cent a day for each person in the nation's population.

If the retail value of vegetables is approximately three times the farm value, the average American actually spent only slightly more than two and one-half cents a day for vegetables, including potatoes, from 1937 to 1941. If the expenditure was slightly greater in 1943, it was so mainly because prices were higher.

Tests Show Need of More Vegetables and Fruits

The statistics on consumption, however, do not prove the need of more vegetables and fruits so convincingly as do actual tests on human beings themselves. Such tests in Pennsylvania, conducted by the Ellen H. Richards Institute of The Pennsylvania State College on more than 7000 persons ordinarily considered to be healthy or at least not definitely ill, representing a wide range of family income, education, racial descent, and geographical distribution within the State,

show in general that it is an understatement to say that one-third of the population is ill-fed. Measurements of such characteristics of nutritional state as weight, skeletal maturity in children, and bone mineralization in persons of all ages, red coloring matter in the blood, night blindness, and the amounts of various minerals and vitamins in the blood, have shown that faulty nutrition is more extensive than has been supposed. Much fewer than two-thirds of the population, as judged by these studies, are in optimum nutrition in the various respects for which objective tests have been devised. As a matter of fact, there are but few of us whose condition could not be improved by improvements in diet.

The items in the dietary in which the greatest deficiencies occur are those supplied by vegetables and fruits. In Pennsylvania, which is not lower in fruit and vegetable consumption than other parts of the country, it has been shown concretely in the investigations under discussion that the population needs at least twice the present vegetable and fruit consumption for the optimum nutritional status of its sons and daughters.

Dietary deficiencies occur, it is true, in factors which are supplied by foods other than vegetables and fruits, such as meats, butter, milk, and eggs. These factors, however, are supplied also in vegetables and fruits; in fact, there is no dietary factor required by human beings which is not to be found in or derived from the leaves of green plants, the ultimate basis of all animal life.

The studies under discussion have been carried on during the past nine years in the Ellen H. Richards Institute at The Pennsylvania State College—for the past eight years co-operatively with the Department of Health, Commonwealth of Pennsylvania. Representative people in many parts of Pennsylvania have been studied. For the past three years the Pennsylvania Mass Nutrition Studies have been conducted in Philadelphia with the collaboration of the Vitamin Research Laboratory, Children's Hospital of Philadelphia, School of Medicine, University of Pennsylvania, and under the auspices of the Philadelphia Child Health Society. Some of the findings of these studies as they relate to the subject under discussion are given on pages 15 to 18.

Analyses of Vegetables Consumed Show Inadequacy of National Supply

If the nutrient content—energy, protein, vitamins, and minerals—of the vegetables consumed annually per person in the United States is estimated from the average analyses of these vegetables as harvested, the inadequacy of our national vegetable consumption, as judged from our nutrient requirements, becomes very evident. All of the vegetables consumed per person annually supply enough to meet the requirements of a man of average weight and physical activity, as

estimated by the Food and Nutrition Board of the National Research Council, of energy for $22\frac{1}{2}$ days, of protein for $24\frac{2}{3}$ days, of calcium for 30 days, of iron for 81 days, of vitamin A for 100 days, of thiamin for $52\frac{1}{2}$ days, of riboflavin for 27 4/5 days, of niacin for 51 days, and of vitamin C for 283 days out of the year.

While it is admitted that cereals, after all, supply most of our energy and meats most of our protein, it should be emphasized that vegetables are our best sources of vitamin C, excepting the citrus fruits, and are among the best sources of vitamin A and niacin. Furthermore, the quantities estimated above are those in the fresh, raw vegetables. The amount of vitamin C left in the vegetables as eaten, after handling, storage or processing, and cooking, probably is considerably less than one-half of that in the fresh, raw products. On this basis, the public obtains probably no more than one-third of its vitamin A and vitamin C requirement from vegetables, which are among the best and cheapest sources of these nutrients.

Representative Members of Five Pennsylvania Families Are Shown With Some of the Produce from their 1943 Victory Gardens

Photograph by B. P. Hess

An Increase in Vegetables Would Improve Our National Dietary Greatly

What would be the effects of doubling our national consumption of vegetables? In essential nutrients, obviously we should obtain twice as much as we now receive from this source: instead of one-third of an average man's yearly requirements of vitamins A and C, he would receive two-thirds; instead of calcium enough for 30 days, he would receive enough for 60 days from his yearly quota of vegetables. On the other hand, energy content would be increased by only the requirement for 22½ days, and protein by that for 24½ days a year.

The greatest increases resulting from a considerable addition to our vegetable dietary, therefore, would be made in the vitamins and minerals, in which we as a population are most seriously undersupplied; the least increase, on the other hand, would be in energy, in which the national dietary is most nearly adequate. The additional protein contained in the increased vegetable supply is, like the minerals and vitamins, needed to obtain a more nearly adequate supply.

An increase in vegetable consumption up to twice the present amount would require no reductions in other foods except in those which supply energy only, namely the sugars and starchy foods, chief of which at present are the refined cereals. On a national basis, the cereals thus displaced from human use might readily be converted to milk and meat by feeding them to livestock, with a resulting gain in nutritional state of the population.

As to manpower and land requirements, little change would result, because these are not greatly different for equal energy and protein content both in vegetables and cereals. The slightly greater manpower requirement would be amply justified by the benefits obtained.

Why Increase Vegetable Consumption by Home Production?

As long as the war continues, any increased manpower for civilian requirements had best be met by greater exertions of the civilians themselves. In home vegetable production, manpower requirements can be met by every member of the family, in most cases in a very healthful, enjoyable way. By home production, furthermore, least demands will be made on transportation facilities, and greatest conservation will be accomplished of the nutrient values of the vegetables produced.

After the war, conversion to increased commercial production will require some time, both to manufacture the increased requirements of machinery and equipment and to replace that which has been worn out during the war, as well as to increase facilities for processing, storing, and distributing the greater quantities of vegetables which the public will want and is entitled to receive. During this period of conversion, Victory gardens in the most satisfactory sense will be re-

quired, not merely to maintain the use of vegetables at the highest level attained during the war, but to increase it to that level required by the best nutrition of the population.

Victory gardens are required now and after the war, in brief, to insure that one of the gains of the war shall be in the nutritional state of all of our population.

PRESENT CONTRIBUTIONS OF VEGETABLES TO THE NATIONAL DIETARY

That vegetables at present are not making the full contribution to the nation's dietary which they might, and that the demands they make upon our purchasing power, crop land, and manpower might well be increased, are shown in the following tables, computed from information contained in the annual publication of the United States Department of Agriculture entitled **Agricultural Statistics**, and from data published by Dr. John H. MacGillivray and associates at the University of California in two reports entitled, respectively, **Food Values on a Pound, Acre, and Man-Hour Basis for California Fresh Vegetables**, and **Labor and Material Requirements of California Vegetables.**

Eleven-year-old Daughter of B. P. Hess, Pittsburgh, Pennsylvania, With Some of the Vegetables Grown in the Family's 1943 Victory Garden

Illustration by B. P. Hess

TABLE I

Energy, Protein, Calcium, and Iron Content of Fresh Vegetables Consumed Annually Per Capita, 1937-1941, as Harvested, in Units Representing the Daily Requirement of Each Nutrient for a Man of Average Size and Activity as Estimated by the Food and Nutrition Board of the National Research Council.

Kind of Vegetable	Annual Per Capita Consumption Lb.*	Day's Requirements of:			
		Energy	Protein	Calcium	Iron
Potato, white	125.6	13.56	13.69	7.79	43.83
Cabbage	26.2	0.84	1.73	4.87	5.79
Potato, sweet	21.3	3.48	2.13	3.43	5.54
Watermelon	18.0	0.40	0.27	0.32	0.63
Tomato	17.2	0.58	1.10	0.67	3.82
Onion	16.6	1.16	1.41	2.84	2.95
Lettuce	13.9	0.26	0.75	2.17	5.07
Celery	10.1	0.21	0.55	2.71	4.81
Carrot	8.9	0.38	0.44	1.34	1.49
Corn, sweet	8.8	0.55	0.80	0.17	0.63
Cantaloupe	8.5	0.14	0.15	0.38	0.60
Bean, snap	7.2	0.41	0.10	2.39	2.58
Spinach	3.2	0.10	0.39	——	——
Cauliflower	2.8	0.06	0.20	0.16	0.43
Beet	2.6	0.10	0.14	0.20	0.47
Asparagus	2.1	0.06	0.22	0.19	0.71
Cucumber	2.1	0.03	0.07	0.20	0.67
Pea	1.7	0.12	0.33	0.10	0.55
Pepper, sweet	1.2	0.04	0.08	0.06	0.15
Bean, lima	0.5	0.04	0.10	0.04	0.17
Artichoke	0.4	0.02	0.04	0.06	0.14
Total	298.9	22.54	24.69	30.09	81.03

* In this and the next two tables, consumption does not include canned and other processed vegetables, of which the nutrient content may vary widely from that at harvest.

TABLE II

Vitamin Content of Fresh Vegetables Consumed Annually Per Capita, 1937-1941, as Harvested, in Units Representing the Daily Requirement of Each Nutrient for a Man of Average Size and Activity as Estimated by the Food and Nutrition Board of the National Research Council.

Kind of Vegetable	Annual Per Capita Consumption Lb.	Day's Requirement of				
		A	B_1	B_2	Niacin	C
Potato, white	125.6	3.77	29.26	10.68	31.40	76.62
Cabbage	26.2	0.87	3.62	2.57	1.44	83.29
Potato, sweet	21.3	41.54	4.30	4.00	5.96	26.58
Watermelon	18.0	3.76	1.44	0.41	1.17	3.51
Tomato	17.2	15.29	3.82	0.83	3.41	22.43
Onion	16.6	0.28	1.30	3.22	0.40	11.32
Lettuce	13.9	1.82	0.89	0.60	1.21	6.96
Celery	10.1	0.29	0.60	0.54	0.48	2.31
Carrot	8.9	11.70	0.61	0.41	0.29	1.35
Corn, sweet	8.8	0.30	1.43	0.33	1.43	1.82
Cantaloupe	8.5	8.70	0.45	0.43	1.00	7.25
Bean, snap	7.2	2.94	1.47	1.20	1.14	4.69
Spinach	3.2	5.95	0.86	1.24	0.42	12.70
Cauliflower	2.8	0.04	0.64	0.21	0.18	5.33
Beet	2.6	0.13	0.17	0.16	0.22	0.58
Asparagus	2.1	1.00	0.77	0.42	0.40	2.86
Cucumber	2.1	0.03	0.09	0.18	0.11	1.07
Pea	1.7	0.49	0.48	0.19	0.40	1.30
Pepper, sweet	1.2	0.80	0.15	0.05	0.14	10.67
Bean, lima	0.5	0.05	0.09	0.12	0.01	0.46
Artichoke	0.4	0.04	0.09	0.02	0.04	0.13
Total	298.9	99.79	52.53	27.81	51.25	283.23

TABLE III

Farm Value, Acreage of Land Occupied, and Man-Hours of Labor Required for the Fresh Vegetables Consumed per Capita Annually.

1937-1941

Kind of Vegetable	Farm Value Dollars	Acres of Land Occupied	Man-Hours of Labor Required
Potato, white	1.133	0.0226	0.837
Cabbage	0.115	0.0013	0.197
Potato, sweet	0.412	0.0061	0.463
Watermelon	0.059	0.0019	0.158
Tomato	0.229	0.0046	0.453
Onion	0.147	0.0009	0.159
Lettuce	0.243	0.0012	0.207
Celery	0.148	0.0003	0.168
Carrot	0.071	0.0004	0.116
Corn, sweet		0.0030	0.124
Cantaloupe	0.109	0.0008	0.106
Bean, snap	0.121	0.0017	0.554
Spinach	0.039	0.0007	0.057
Cauliflower	0.045	0.0002	0.032
Beet	0.007	0.0002	0.037
Asparagus	0.074	0.0009	0.131
Cucumber	0.034	0.0010	0.033
Pea	0.075	0.0031	0.113
Pepper, sweet	0.030	0.0002	0.028
Bean, lima	0.009	0.0005	0.028
Artichoke	0.013	0.0001	0.012
Total	3.113	0.0529	4.013

THE NUTRITIONAL LEDGER

Pauline Beery Mack,[1] Director of Nutrition, War Services, Pennsylvania State Council of Defense

The question of whether or not the nutritional status of civilians in general is such that home production of vegetables is not needed in 1944 is pertinent. Pennsylvania is fortunate in having information about her civilians which helps to answer these questions.

The findings from the Pennsylvania studies are being calculated and analyzed as rapidly as possible, in order to help us in these times to better ourselves nutritionally. From the records of about 3500 people, tested before 1942, these conclusions can be drawn:

(1) Only those in the lowest income groups, on the average, fail to get enough, or nearly enough energy foods in the diet.

(2) Few people obtain sufficient protein.

(3) Calcium goes down sharply in the diet with income; but many people, chiefly growing children and expectant mothers, even in the higher incomes, are far too low in this important nutrient.

(4) Phosphorus decreases in the diet with income, but not so sharply as does calcium.

(5) Iron is likely to be low in the diet, on the average, at all income levels.

(6) Vitamin A is low in the dietary for many people at all income levels; and the quantity declines sharply with income.

(7) The various components of the vitamin B complex, notably vitamin B_1 (thiamin), vitamin B_2 (riboflavin), and niacin are generally low in the American dietary. This is partly the result of our gradual change to white refined flour products (the germ of the wheat and hence much of the nutrient value of the grain except energy has been lost in overmilling to produce whiteness), and partly our failure to eat as many fruits and vegetables and as much lean meat and liver as we need.

(8) Vitamin C in the diet is lower than it should be in many cases, and goes down with income.

Too few of the people are in an optimum class with respect to skeletal maturity and mineralization. Here, too, there is a dearth in many cases of calcium, phosphorus, and proteins, principally, as well as other nutrients needed for skeletal growth and development.

Dental status is generally bad; only 10 persons out of the 3500 under discussion have been adjudged to have teeth and gums which are perfect in all respects. Dental caries, or decay, has been one of the

[1] Director of the Ellen H. Richards Institute, The Pennsylvania State College.

Measuring Dark Adaptation by Means of a Biophotometer. Green Leafy and Yellow Vegetables, Because of Their Content of Carotene, or Pro-Vitamin A, Aid in This Function.

chief physical deficiencies found among those being examined for military duty, both in this and in the last war. Although the dietary secret of good dental status has not yet been found in its entirety, there is no doubt but that the teeth need most if not all of the body

nutrients for good development and maintenance. Alkaline-forming foods (fruits and vegetables of all kinds) must be considerably in excess of acid-forming foods for proper maintenance. There is also considerable research evidence to indicate that considerable amounts of concentrated sugar in the diet are associated with a high incidence of dental caries.

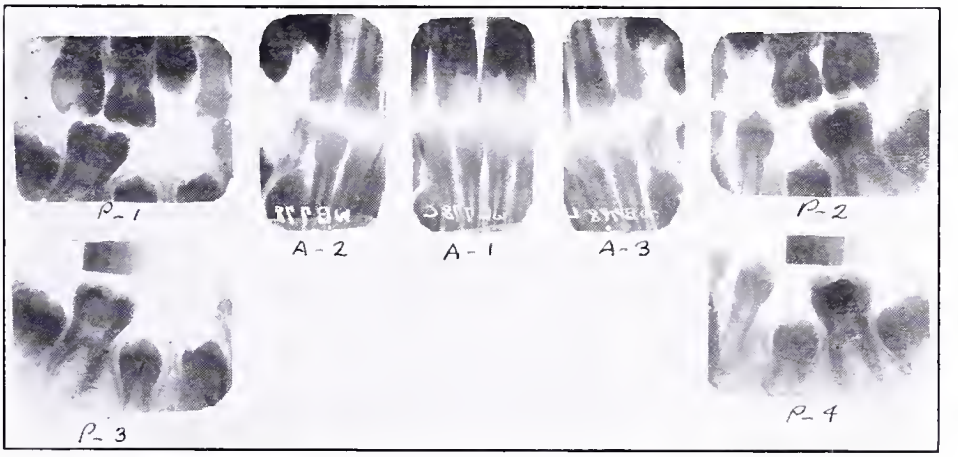
The dark adaptation test is related to a vitamin A deficiency. In this study it is found that dark adaptation, or ability to adjust one's eyesight to abrupt changes from bright light to semi-darkness, is a dietary matter related to vitamin A intake and perhaps also to other nutrients as well.

In a more recent study of 1362 metropolitan children, also conducted as a part of the Pennsylvania Mass Nutrition Studies (Ellen H. Richards Institute Research Series Number 2), the earlier findings have been confirmed. Of these children, representing a wide economic range,

46.43 per cent., only, were receiving the amount of energy-containing foods recommended by the Food and Nutrition Board, National Research Council, for their respective ages and sexes;

41.07 per cent. were receiving the recommended amounts of protein;

26.79 per cent., the recommended amounts of calcium;



Set of Dental Radiographs of an 11-Year Old Boy
More Vegetables are Needed in Dietary for Better Dental Status

A-1, Anterior Bite-Wing Film Number 1, showing the upper and lower incisors, and part of lateral incisors;
A-2, Anterior Bite-Wing Film Number 2, Right;
A-3, Anterior Bite-Wing Film Number 3, Left;
P-1, Posterior Bite-Wing Film Number 1, Right;
P-2, Posterior Bite-Wing Film Number 2, Left;
P-3, Posterior Standard Film Number 1, (inserted in a Bite-Block) Right, Lower;
P-4, Posterior Standard Film Number 2, (inserted in a Bite-Block) Left, Lower.

29.77 per cent., the recommended amounts of phosphorus[1];
45.98 per cent., the recommended amounts of iron;
25.89 per cent., the recommended amounts of vitamin A[1];
39.73 per cent., the recommended amounts of thiamin (vitamin B_1);
45.09 per cent., the recommended amounts of riboflavin (vitamin B_2);
4.02 per cent., the recommended amounts of niacin;
46.43 per cent., the recommended amounts of ascorbic acid (vitamin C); and
4.46 per cent., the recommended amounts of vitamin D.

In the light of these findings on representative Pennsylvania citizens, the 1944 Victory Gardens in the Commonwealth should give especial emphasis to all of the following nutrients:

Protein
Calcium
Phosphorus
Iron
Vitamin A
Thiamin (vitamin B_1)
Riboflavin (vitamin B_2)
Niacin
Ascorbic Acid (vitamin C)

In the descriptions of vegetable nutritional values which follow, select vegetables which make notable contributions of these nutrients. Choose a plan to fit your available land and to fit your family needs. The chief aim of a 1944 Victory Garden is to improve the nutrition of your specific family. Do a scientific job of planting the garden and caring for it throughout the season.

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[1] All values are taken from the recommendations of the National Research Council, Food and Nutrition Board, except those for phosphorus and vitamin A. No recommendation for phosphorus is made by this agency, and hence that of the Bureau of Nutrition and Home Economics, Washington, D. C., is taken.

With respect to vitamin A, the recommendations of Munsell, Hazel E. (*Vitamins and Their Occurrence in Food*; The Milbank Memorial Fund Quarterly, Volume XVIII, Number 4, pages 311-344) were chosen rather than those of the National Research Council in that the dietaries of those in the study under consideration included vitamin A largely as the pro-vitamin, carotene, and hence the Munsell standards were more applicable.

V V V V V V V

THE NUTRITIONAL VALUE OF VEGETABLES AND FRUITS

The nutrition teacher or research worker usually groups foods into major categories in order to simplify teaching or the presentation of research data. The groups most frequently used for this purpose are: milk; meat, poultry, fish; eggs; beans (except snap beans), peas, and nuts; leafy, green, and yellow vegetables; tomatoes and citrus fruit; dried fruit; other fruits and vegetables; bread and cereal products; potatoes; fats; sugar.

It is noted that six of these twelve groups include vegetables and fruits. The chief nutritional contributions of these groups may be summarized as given below, and the specific content of the more common vegetables and fruits, according to the most recent tables of analyses, are given immediately after the descriptive paragraphs. This is further followed by lists of the mineral and vitamin contributions of the vegetables more commonly raised in the home garden; the latter lists are arranged in descending order of content of the particular mineral or vitamin mentioned.

Beans (not including snap beans, which are included with the leafy, green, and yellow vegetables) and **peas** are legumes which are high in protein value, although their proteins are not regarded as having sufficient amounts of the amino acids required by the human body, and should, therefore, not be used as the sole source of protein foods. They are of high caloric value and they make some contributions to the mineral and vitamin content of the dietary. Peas are relatively high in vitamin A content, which is associated with many physiological functions, notably growth and dark adaptation. Both beans and peas, particularly soy beans, are good sources of vitamin B_1, which is the anti-neuritic vitamin enjoying such wide attention at the present time.

Nuts are grouped with beans and peas because they, too, are good sources of vegetable protein.

Leafy, green, and yellow vegetables include such a wide variety of foods as asparagus, broccoli, celery, Swiss chard, endive, collards, yellow sweet corn, beet, dandelion, mustard, and turnip greens, kale, lettuce, parsley, snap beans, spinach, and water cress. Vitamin A is one of the chief ingredients of these foods, although the quantity present varies widely from one food to another. Other nutrients contained in the foods of this category usually range rather generally throughout the list of nutrient factors. The leafy vegetables, particularly, supply a wide variety of nutrients. In fact, the leaves of plants are unique in being a complete food, by virtue of their biological function of serving as the seat for the synthesis of the proteins, carbohydrates, fats, and other nutrient constituents of the plant.

None of the storage or other organs of the plant enjoys this same distinction. The ability of human beings to subsist upon a strictly vegetarian diet is unquestionably dependent upon the inclusion of leafy vegetables in this diet. Although nutrition experts generally recommend a mixed diet of vegetable and animal foods because of the bulk of an adequate vegetable diet, the value of the leafy vegetables is emphasized for the reasons aforementioned.

The foods in the broad classification of leafy, green, and yellow vegetables are generally high in their content of iron. Although the work of numerous recent investigators has shown a wide difference between the utilizable quality of iron in different foods, with iron in the vegetable foods not ranking generally so high as that in meat, the vegetables nevertheless are valuable sources of this nutrient even though they may not be the equivalent, weight for weight, of meat in this respect.

Tomatoes and **citrus fruits** rank at the top among the sources of vitamin C, or ascorbic acid, the anti-scorbutic vitamin, which now is known to be intimately related to many physiological functions, including the well-being of the teeth and bones as well as of the soft tissues of the body. Tomatoes also furnish small amounts of riboflavin, a vitamin having some function in the oxidation processes of the cell; it is one of the vitamins formerly included in what is now known as the B-complex. The location of riboflavin throughout the common foods has not yet been thoroughly investigated, and it is probable that it will be found more generally throughout the vegetable kingdom as further investigations are made.

Dried fruits are sources of many nutrients. Moreover they can be purchased cheaply or produced at home as a part of the Victory Garden Program.

The **potato** is a relatively high energy food, with but little supplementary value as a protein. It makes some small contributions to the mineral and vitamin content of the diet but is not outstanding in any one respect. It should be borne in mind, however, that small additions of the various nutrient factors from many foods help to swell the daily total supply of food factors; and an article of diet which makes contributions to many of the body needs, even though the amount of each contribution is relatively small, has some general value in the dietary.

With respect to the common belief that potatoes are fattening, it may be said that they are no more so than an equivalent amount of calories from any other source. No food is fattening unless it is added to a diet which is adequate without it.

Other fruits and vegetables include a wide variety of foods which those interested in simplifying nutritional information for the benefit

of the housewife untrained in dietetics have not marked for particular distinction, but which are valuable for the wide variety of contributions which they make to the day's dietary. In using the 12-class arbitrary grouping system under discussion, those dealing with lay groups emphasize the value of choosing regularly from each of these groups so that all of the nutrients needed for the growth and maintenance of the human being will be supplied.

PROTEINS, MINERALS, AND VITAMINS IN AVERAGE SERVINGS OF COMMON VEGETABLES

Protein

Vegetable	Weight in gms.	Measure	grams
Beans, soy, dried	30	½ cup, cooked	10.5
Peas, dried, split	30	½ cup, cooked	7.4
Lentils, dried	30	½ cup, cooked	7.4
Peas, dried, whole	30	½ cup, cooked	7.1
Beans, navy, pea bean, kidney, pinto, and others	30	½ cup, cooked	6.6
Beans, lima, dried	30	½ cup, cooked	6.2
Beans, soy, fresh	100	⅔ - ¾ cup	12.5
Beans, soy, sprouts	100	1 cup, scant	8.5
Beans, lima, fresh	100	½ cup	7.5
Peas, fresh, shelled	100	½ cup, scant	6.7

Calcium[1]

Vegetable	Weight in gms.	Measure	grams
Cabbage, loose outer leaves	100	⅔ cup, cooked	0.429
Broccoli leaves	100	½ cup, cooked	.314
Turnip greens	100	½ cup, cooked	.254
Mustard greens	100	½ cup, cooked	.220
Collards	100	½ cup, cooked	.202
Kale	100	½ cup cooked	.181
Broccoli	100	½ cup, scant, cooked	.146
Onions, young, green	50	5, 5¼" long, ½" diameter	.135
Dandelion greens	100	½ cup, cooked	.113
Rutabagas	100	½ cup, cooked	.074
Celery stalks	50	2 stalks	.036
Leeks	100	3 - 4, 5" long	.058
Parsnips	100	½ large	.057
Carrots, fresh	100	1 large	.042

[1] **Only vegetables of which the calcium is nutritionally available have been listed. Thus spinach, beet greens, swiss chard, dock, and sorrell have been omitted intentionally.**

CALCIUM (Continued)

Vegetable	Weight in gms.	Measure	grams
Escarole	50	2 large leaves	.037
Endive	50	15 - 20 inner leaves	.037
Potatoes	150	1 medium large	.020
Cauliflower	70	4 rounded tablespoons	.018
Lettuce, green	10	1 large leaf	.005
Lettuce, iceberg	10	1 large inner leaf	.002

Iron

Vegetable	Weight in gms.	Measure	milligrams
Mustard greens	100	½ cup cooked	5.6
Turnip greens	100	½ cup cooked	3.5
Spinach	100	½ cup cooked	3.4
Beet greens	100	½ cup cooked	3.2
Swiss chard	100	½ cup cooked	3.1
Dandelion greens	100	½ cup cooked	3.0
Kale	100	½ cup cooked	2.5
Cabbage, fresh leaf	100	⅔ cup cooked	1.8
Potatoes, white	150	1 medium large	1.7
Onions, young green	50	5, 5¼" long	1.2
Endive, curled	50	10 - 15 inner leaves	0.9
Escarole	50	2 large leaves	0.9
Carrots	100	1 large	0.7
Leeks	100	3 - 4, 5" long	0.7
Cabbage, head	100	⅔ cup cooked	0.4
Lettuce, green	10	1 large leaf	0.1
Lettuce, iceberg	10	1 large leaf	0.05

Vitamin A

Vegetable	Weight in gms.	Measure	I. U.
Spinach	100	½ cup cooked	10,000 - 25,000
Beet greens	100	½ cup cooked	16,100
Dock or Sorrel	100	½ cup cooked	15,000
Kale	100	½ cup cooked	10,000 - 20,000
Mustard greens	100	½ cup cooked	10,200
Lambsquarters	100	½ cup cooked	10,000
Turnip greens	100	½ cup cooked	10,000 - 15,700
Dandelion greens	100	½ cup cooked	9,000 - 12,000
Escarole	50	2 large leaves	7,500
Broccoli	100	½ cup cooked	3,000 - 9,000
Carrots	100	1 large	2,100 - 10,000

VITAMIN A (Continued)

Vegetable	Weight in gms.	Measure	I. U.
Parsley	10	10 sprigs	3000
Collards	100	½ cup cooked	2000 - 6000
Squash, winter	100	½ cup cooked	2000 - 4000
Endive or Chicory	50	15-20 inner leaves	1925
Onions, young green	30	5 - 5¼"	1800
Lettuce, green	10	1 large leaf	400
Lettuce, iceberg	10	1 large leaf	10

Thiamin or B_1

Vegetable	Weight in gms.	Measure	Micrograms
Beans, soy, fresh	100	⅔ - ¾ cup	525
Beans, soy, dried	30	½ cup cooked	360
Peas, fresh	100	½ cup cooked	270 - 495
Beans, lima, fresh	100	½ cup cooked	250 - 350
Collards	100	½ cup cooked	150 - 250
Dandelions	100	½ cup cooked	150 - 225
Potatoes, white	150	1 medium large	143 - 248
Turnip greens	100	½ cup cooked	138 - 180
Beans, lima, dried	30	½ cup cooked	135 - 180
Kale	100	½ cup cooked	120 - 190
Beans, navy, pea bean, kidney, pinto and others	30	½ cup cooked	120 - 180
Corn, sweet, yellow	100	1 medium ear	120 - 150
Mustard greens	100	½ cup cooked	138
Spinach	100	½ cup cooked	95 - 155
Broccoli	100	½ cup, scant, cooked	80 - 100
Cabbage, fresh leaf	100	⅔ cup cooked	70 - 140
Turnips, white	100	½ cup cooked	65 - 95

Riboflavin [1]

Vegetable	Weight in gms.	Measure	Micrograms
Turnip greens	100	½ cup cooked	750
Beet greens	100	½ cup cooked	625
Kale	100	½ cup cooked	400 - 600
Mustard greens	100	½ cup cooked	375
Beans, navy, kidney, pinto	30	½ cup cooked	360
Spinach	100	½ cup cooked	300 - 400
Beans, lima, fresh	100	½ cup cooked	250
Collards	100	½ cup cooked	250
Soy beans, fresh	100	⅔ - ¾ cup cooked	250

[1] **Figures are for raw vegetables. Losses in cooking will vary with method.**

RIBOFLAVIN (Continued)

Vegetable	Weight in gms.	Measure	Micrograms
Beans, lima dried	30	½ cup cooked	237
Soy beans, dried	30	½ cup cooked	225
Dandelions	100	½ cup cooked	225
Broccoli	100	½ cup cooked	200 - 500
Peas, fresh	100	½ cup, scant, cooked	200 - 250
Cauliflower	70	4 rounded Tbsp.	150 - 154
Lettuce, green	10	1 large leaf	19
Lettuce, iceberg	10	1 large leaf	4

Niacin

(NOTE: The majority of foods are not yet analyzed for niacin content and hence tables of values for this nutrient are only fragmentary now. Hence the following list of niacin-containing vegetables is not complete.)

Vegetable	Weight in gms.	Measure	Milligrams
Beans, soy, fresh	100	⅔ - ¾ cup	4.8
Spinach, fresh	100	½ cup, cooked	1.7
Potatoes, white	100	1 small, boiled	1.5
Pepper, green	100	1 pod or shell	1.2

ASCORBIC ACID (VITAMIN C)[1]

Vegetable*	Weight in gms.	Measure	Milligrams
Mustard greens	100	½ cup, cooked	125
Pepper, green	100	½ empty shell	90 - 150
Cabbage, green	50	½ - ¾ cup, raw	25 - 45
Turnip, white	100	½ Cup, cubes	20 - 30
Tomato, red	100	1 medium	21 - 24
Cabbage, Chinese	50	1 large serving	20
Turnip greens	100	½ cup, cooked	20 - 60
Spinach	100	½ cup, cooked	15 - 50
Potato, white	150	1 medium cooked (allows for 50% loss in cooking)	10.5 - 22.5
Onions, young green	50	5, 5¼" long	7
Endive, curled	50	15 - 20 leaves	5 - 7
Watercress	10	10 average sprigs	4.3 - 6.6
Carrot	100	1 large	3 - 5

[1] These data are based upon the vitamin C content of raw vegetables, unless otherwise indicated.

* With the exception of potatoes only vegetables are listed which can be eaten raw and if well masticated, be digested fairly well. Cooking may destroy considerable amounts of vitamin C unless it is done for a short time only with much care.

PROTEINS

Proteins constitute the chief material of which our bodily tissues are built; this material is present in all living cells of the human, animal, and plant body. Nothing else can take its place in building new body tissues or in replacing losses of body tissues, worn out through usage. Aside from their importance in building the living cells of the body itself, proteins have other important functions in nutrition in that certain hormones and enzymes used in regulating body functions are composed in part or in their entirety of protein substances, and hence we must obtain this type of nutrient in the diet in order to build these accessory materials, as well as the structure of the body itself.

During exercise, the contraction and expansion of the muscles produce lactic acid in considerable quantities from carbohydrates, and the proteins in the muscles combine with this lactic acid in such a way as to prevent acidity from building up to a harmful degree. This protective, or buffer action, of proteins is an important function which is shared by some other nutrients as well, particularly certain minerals.

Proteins provide some energy to the body, since, during the normal course of bodily activity, protein tissues undergo destruction with a liberation of chemical energy. In times of starvation, the oxidation of the protein tissues themselves serves as the chief source of body energy as long as they hold out, although under normal circumstances carbohydrates and fats are the body's primary and secondary supplies of energy, respectively.

An intake of protein insufficient for purposes of building the new body tissues of growing children will lead to subnormal growth. Deficiencies of protein of a severe and prolonged type may lead to a tendency to form abnormal accumulations of water in the tissue spaces, particularly in the extremities. In this deficiency disease edema— excessive swelling accompanied by extreme weakness and the wasting away of the muscles—characterizes the disorder.

Protein deficiency may result from causes other than too low an amount of protein in the dietary. Gastrointestinal disorders may interfere with proper protein digestion, and certain diseases may be associated with heavy losses of protein from the body. These cases require the personal care of a physician.

Rich food sources of proteins are lean meat including poultry and fish, eggs, milk, and some vegetables, particularly peas, beans, nuts, and the germ of cereal grains. The proteins from vegetable sources should be supplemented by a liberal supply of meat, milk, and eggs.

CALCIUM

Calcium is an important part of bones and teeth. It is essential in soft tissues and blood for regulating the functions of muscles and nerves. The calcium in the blood, although small in amount, is necessary for the clotting of blood, and it assists in regulating the functioning of muscles and nerves. For example, the calcium in blood and in the soft tissues of the body is responsible in part for the beating of the heart as well as for other involuntary muscle functioning. Failure to obtain sufficient calcium in growing children leads to stunted growth, and in adults to inadequate mineralization of bones and poor functioning of the muscles and nerves. In pregnancy and lactation or nursing, women frequently impair their own bodies as well as those of the offspring by providing insufficient calcium for the needs both of mother and child.

Rich food sources of calcium are meat, milk, whole cereal grains, certain fruits and vegetables particularly outer leaves of cabbage, broccoli leaves, turnip greens, mustard greens, collards, and kale.

IRON

Iron is an essential part of the hemoglobin or red coloring matter of the blood cells. Here its function is to help carry oxygen to each cell in the body. Practically all of the remainder of the iron in the body is to be found in the liver, the bone marrow, and the spleen, waiting to be converted into hemoglobin as needed. Each day almost an ounce of hemoglobin is formed in the body in order to supply more than a trillion red blood cells. The manufacture of blood cells must go on continuously in the body, since the old cells are being continually worn out through body activity. The quantity of iron used in the new cells which are manufactured each day is much greater than that supplied in the dietary; but a considerable part of the iron from the worn-out cells may be re-used for the new cells. As the old cells are destroyed, the iron is deposited in the bone marrow, which is sort of a hemoglobin factory. A sufficient amount of iron is not obtained from the worn-out cells, however, and new iron must be added continually in the dietary to keep up the red cell content of the blood.

Rich food sources of iron are liver, egg yolk, some fruits and vegetables, notably greens. Much more iron must be taken in with our food than is actually required by the body, since a considerable part of the iron in foods is tied up in chemical combinations which cannot be broken down in such a way as to make all of it available. To say that a food contains so much iron does not give the complete story of the suitability of that food for hemoglobin-building, since some foods have a higher percentage of iron which is available for body use than others. According to the work of numerous investigators, the iron in calf's liver, in egg yolk, and in apricots can be converted

almost one hundred per cent. into body hemoglobin. Other foods vary as to the convertibility of the iron which they contain. All this makes it necessary to be careful in supplying iron in foods with a sufficient margin of safety to compensate for that which the body may not be able to use in its entirety.

VITAMIN A

Vitamin A is required by all children for proper growth, and by human beings of all ages for the maintenance of the proper condition of the epithelial tissues, as in respiratory, digestive, and urinary tracts and in glands of internal secretion. It is also necessary for proper formation of the teeth. Another function of this vitamin is its association with the ability of a person to adjust his sight when going from a brightly lighted place to a dark or dimly lighted one. It is essential for the regeneration of visual purple in the eye, a phototropic substance in the retina which is very sensitive to light. Vitamin A is associated with the presence or absence of the deficiency disease known as night blindness or the inability to see well after dark, but not all cases of night blindness are associated with vitamin A deficiency.

There is a popular belief that vitamin A prevents infection such as colds. From the present medical point of view, however, this is not true in its strictest sense, although a deficiency in vitamin A unquestionably lowers the resistance of the body cells and may thereby be related in some measure to the ability to withstand infection. If the body has a good store of vitamin A, and the foods which one eats supply liberal amounts of this vitamin daily, an additional amount of the vitamin will not produce further increases in resistance to infection, as is believed in some quarters.

When animals, including human beings, are deprived in large part of vitamin A, they cannot grow or rebuild worn-out bodily tissues. Such delicate organs as the eyes, when deprived of this vitamin, may likewise become affected by infection. In extremely acute stages of vitamin A deficiency, xerophthalmia, a serious eye disease which may cause complete and permanent blindness if not arrested, is found in rare instances.

Rich food sources of vitamin A are liver, butter, cream, eggs, some kinds of cheese, fish liver oils, some fruits, and some vegetables, especially the green leafy and the yellow vegetables.

VITAMIN B_1 (THIAMIN)

Vitamin B_1, or thiamin, is associated with the proper functioning of the nervous system. It is an essential part of an enzyme in the human body which is necessary for the complete and proper oxidation of sugar. It seems probable that the several signs of thiamin de-

ficiency—impaired functioning of the nervous system, loss of appetite, loss of muscle tone, particularly in the intestines, loss of weight, a slowing of the heart rate, and occurrence of pains and weakness in the limbs in severe cases—are probably results of disordered and incomplete oxidation of sugar in the body. A disease known as beri-beri, associated with severe polyneuritis, final loss of nervous and muscular control, and heart failure (as ultimate cause of death), not uncommon in oriental countries, is a specific vitamin B_1 deficiency disease. In this country, the symptoms of vitamin B_1 or thiamin deficiency are generally comparatively mild, but nevertheless they are important enough to be considered and avoided.

Vitamin B_1 is widely distributed in natural foods, both in the animal and plant kingdoms, and important sources are: yeast, soy beans, whole grains (germs and outer layer of seeds), pork, liver, other organs of animals, muscle meats of many animals, peanuts, egg yolk, legumes, and many vegetables. Although it is present in foods, it may be lost to a considerable extent in the cooking process unless cooking is done with care, and the cooking waters are retained and used in soups or gravies.

VITAMIN B_2 (RIBOFLAVIN)

Specifically, lack of adequate riboflavin in the dietary is characterized by cessation of growth, and a specific skin disorder which results in lesions of the lips, cracks at the angles of the mouth and greasy accumulations at the angles of the nose. According to several investigators, if the person is deficient in riboflavin there are also certain abnormal changes in the eye, in the form of invasion of the cornea by loops of capillaries. A general failure in nutritional well-being, digestive disturbances, nervous depression, increased susceptibility to infection and diminished vitality are nonspecific but often observed, if the supply of riboflavin is inadequate.

Riboflavin is widely distributed in the plant and animal kingdoms, particularly in yeast, milk, liver, beef heart, and beef kidney. Beet greens, turnip greens, mackerel, and oysters also afford notable quantities of this nutrient.

NIACIN

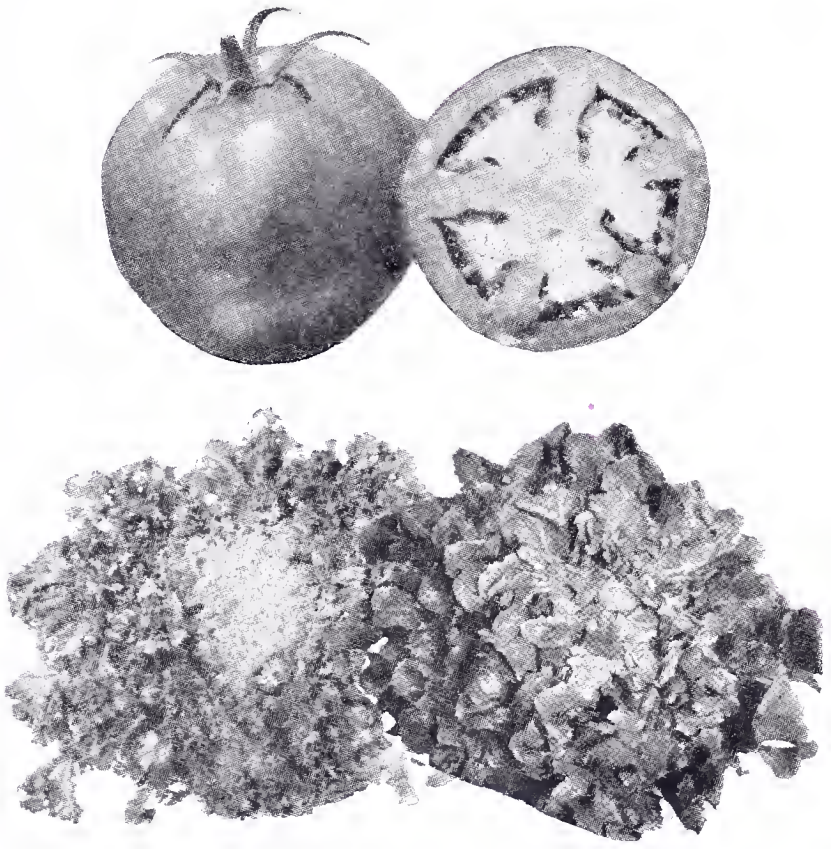
Niacin is a constituent of certain co-enzymes which are essential in tissue respiration. It prevents the specific deficiency disease, pellagra, which is characterized by skin eruption (dermatitis), affecting especially the backs of the hands and forearms, face, neck, and feet; digestive disturbances (diarrhea); and nervous disorders. The severity of the disease is increased by exposure to sunshine.

Important natural sources of niacin are beef, liver, pig liver and kidney, all kinds of lean meat and poultry, salmon, wheat kernel and bran, peanuts, peanut butter, brown rice, whole wheat, and yeast.

VITAMIN C (ASCORBIC ACID)

Vitamin C is not only specific for the cure and prevention of scurvy, but it is essential for growth and maintenance of normal bones and teeth and maintenance of healthy gums. There are many observations suggesting that the presence of infection creates an increased demand for vitamin C and that it may be helpful in controlling the immune bodies used to combat infections. Vitamin C is also necessary for the proper healing of wounds, even though they may not be infected, because of its essential control of the normal deposition and maintenance of intercellular substances. Inadequate supply of ascorbic acid may cause anemia, hemorrhage, pyorrhea, and certain abnormal gum conditions.

Vitamin C is distributed widely in the growing tissues of all plants. It is formed rapidly in sprouting seeds and reaches high concentrations in actively growing parts of the plant (root tips, green leaves, seeds) and is, therefore, found in all fresh fruits. Paprikas, tomatoes, and wild rose seed pods (hips) are the richest sources. Other fruits and vegetables rich in vitamin C are oranges, lemons, grapefruit, fresh strawberries, raw cabbage, and green peppers.



Nutrient Content of Common Vegetables and Fruits[1]

Food	Wt. Gms.	Approximate Measure	Pro. Gms.	Fat Gms.	CHO Gms.	Cal-ories	Ca Gms.	P Gms.	Fe mg.	Vitamins					
										A I.U.	Thiamin (B_1) micro-grams	Ascorbic Acid mg.	D I.U.	Riboflavin micro-grams	Niacin[2]
Artichokes, French, A.P.	200	1 large	2.8	.4	11.4	60	.037	.083	1.0	144-288	84	10			
Artichokes, Jerusalem	100	1 large	2.2	.1	17.0	78	.030	.033	.4		150	3-5.8			
Asparagus, fresh	50	4 to 5 stalks, 4" long	1.1	.1	2.0	13	.011	.026	.6	150-350	75-90	7.5-20.		50	
Asparagus, canned	50	4 to 5 small tips	.9		1.5	10	.008	.020	.5	150-350	49	?		<50	
Bamboo shoots	100	3/4 cup	2.5	.3	5.1	33	.007	.059	.7		30-75	9.4			
Beans, canned, with pork[3]	100	1/2 cup, 3 r. tbsp.	5.7	2.0	19.0	117	.042	.131	2.8	74	120	?			
Beans, canned, without pork[3]	100	1/2 cup, 3 r. tbsp.	6.0	.4	18.8	103	.042	.131	2.8	74	120	?			
Beans, lima, fresh	100	1/2 cup, 4 r. tbsp.	7.5	.8	23.5	131	.031	.112	2.3	+	250-350	15-35		250	
Beans, lima, dried	30	1/2 cup, cooked	6.2	.4	18.5	102	.022	.114	2.7	+	135-180	-		237	
Beans, mung, sprouts	100	1 cup, scant	2.9	.3	4.0	30	.042	.054	1.0	35	30	90-231		120	
Beans, navy, pea bean, kidney, pinto and others	30	1/2 cup, cooked	6.6	.5	18.6	105	.044	.139	3.1	+	120-180	-		360?	
Beans, string, fresh	100	1/2 cup, cooked	2.4	.2	7.7	42	.065	.044	1.1	600-1800	55-95	10-20		65-150	
Beans, string, canned	100	1/2 cup, drained	2.0	.2	6.6	36	.039	.026	.7	514-1542	47-81	?		+	
Beans, soy, curd	100	3-1/2 oz.	7.5	4.2	3.4	81	.060	.136	1.8						
Beans, soy, dried	30	1/2 cup, cooked	10.5	5.4	3.6	105	.068	.176	2.5	30	360	-		225	
Beans, soy, fresh	100	2/3 - 3/4 cup	12.5	6.5	6.0	132	.067	.225	2.8	200	525	40		250	4.8
Beans, soy, milk	100	3-1/2 oz.	3.4	1.5	2.0	35	.021	.045	.7						
Beans, soy, sprouts	100	1 cup, scant	8.5	1.8	6.3	75	.040	.070	1.8						
Beets, fresh	100	1/2 - 5/8 cup, diced	1.6	.1	9.6	46	.026	.039	.9	<100	25-95	3-5		70-120	

Note: These values were taken from "Food Values of Portions Commonly Used" by Bowes and Church.

All teachers and others interested in nutrition should have this complete book of food values from which this abbreviated list was taken. This may be secured for $1.00 from The Philadelphia Child Health Society, 311 South Juniper Street, Philadelphia, Pennsylvania.

Food	Wt. Gms.	Approximate Measure	Pro. Gms.	Fat Gms.	CHO Gms.	Calories	Ca Gms.	P Gms.	Fe mg.	Vitamins: A I.U.	Thiamin (B_1) micrograms	Ascorbic Acid mg.	D I.U.	Riboflavin micrograms	Niacin
Beet greens	100	1/2 cup, cooked	2.0	.3	5.5	33	.134	.039	3.2	16100	111	35		625	
Broccoli	100	1/2 cup, sc., cooked	3.3	.2	5.5	37	.146	.072	1.4	3000-8000	80-100	50-130		200-500	
Brussels sprouts	70	6 average	3.1	.4	6.2	41	.018	.074	.8	210-350	120	9.1-35.0		63-126	
Cabbage, fresh, head	100	2/3 cup, cooked	1.4	.2	5.3	29	.045	.028	.4	30-80	70-140	50-90		65-135	.3
Cabbage, fresh, leaf	100	2/3 cup, cooked	1.4	.2	5.3	29	.429	.072	1.8	880	70-140	50-90		65-135	.3
Cabbage, raw, head	50	1/2 - 3/4 cup	.7	.1	2.7	15	.023	.014	.2	15-40	35-70	25-45		33-68	.2
Cabbage, Chinese, raw	50	1 lg. serving	.7	.05	1.2	8	.025	.027	.5	1000	38	20		19	
Carrots, fresh	100	1 large, 2/3 cup cubes	1.2	.3	9.3	45	.042	.040	.7	2100-10000	60-140	3-5		60-120	<.5
Cauliflower, fresh	70	4 r. tbsp.	1.7	.1	3.4	22	.018	.046	.6	21-49	91-140	34-66		105-154	
Celeriac, fresh	100	4 to 6 roots	1.7	.3	8.8	45	.047	.071	.8						
Celery, fresh, raw 4	50	2 stalks or hearts	.7	.1	1.9	11	.036	.023	.4	3-25	10-25	3-4		15-28	
Chard, Swiss	100	1/2 c. leaves and stalks	1.4	.2	4.5	25	.104	.050	3.1	9000		10-20		75	
Chickory or Endive, curled	50	15-20 inner leaves	.8	.1	1.5	11	.037	.019	.9	1925	50	5-7		118	
Chickory or Endive, curled	25	10 sm. leaves, av. serving	.4	.05	.8	6	.019	.010	.5	963	25	2.5-3.5		59	
Collards	100	1/2 cup, cooked	3.9	.6	7.2	50	.202	.074	1.6	2000-6000	150-250	30-60		250	
Corn, sweet, fresh, yellow	100	1 medium ear	3.7	1.2	20.5	108	.009	.120	.5	500	120-150	8-11		50-120	
Corn, sweet, canned, yellow	100	1/2 cup, canned	2.5	.9	19.6	96	.009	.098	.5	500	100	6?		50-120	
Cucumber, raw	50	1/2 med., 8 slices, peeled	.4	.05	1.4	8	.005	.011	.2	8-25	45	1-6.5		75	
Dandelion greens	100	1/2 cup, cooked	2.7	.7	8.8	52	.113	.041	3.0	9000-12000	150-225	5-40		225	
Dock or sorrel	100	1/2 cup, cooked	2.1	.3	3.4	25	*			15000		50-80			
Egg plant	100	1/2 cup, cooked	1.1	.2	5.5	28	.009	.020	.5	20-100	40-100	1-9		25	
Escarole	50	2 large leaves	.8	.1	2.0	12	.037	.019	.9	7500	50-60	3-5		50-200	
Kale	100	1/2 cup, cooked	3.9	.6	7.2	50	.181	.067	2.5	10500-20000	120-190	50-100		400-600	
Kohlrabi	100	1/2 - 2/3 cup, diced	2.1	.1	6.7	36	.078	.057	.7		40-70	40-80			
Lambsquarters	100	1/2 cup, cooked	3.8	.7	8.3	55				10000	+			+	
Leeks	100	3-4, 5" long	2.5	.4	7.9	45	.058	.056	.7	+	96	10-20		+	
Lentils, dried	30	1/2 cup, cooked	7.4	.3	18.0	104	.029	.110	2.5		90-100	-		57	
Lettuce, iceberg	10	1 lg. inner leaf	.1	.02	.3	2	.002	.004	.05	10	5-13	.6-2.1		4	
Lettuce 5	10	1 lg. green leaf	.1	.02	.3	2	.005	.003	.1	400	5-13	.6-2.1		19	
Lettuce, Romaine	10	1 lg. leaf or 2 sm.	.1	.04	.3	2	.005	.005	.09	80	9	1.0		8	
Mushrooms, fresh	100	4 lg. or 10 sm.	*	.3	*	*	.014	.098	.7	-	100-200	3-6			
Mustard greens	100	1/2 cup, cooked	2.3	.3	4.0	28	.220	.066	5.6	10200	138	125		375	
Okra, seeds incl.	50	5 to 6 pods	.9	.1	3.7	19	.036	.031	.4	150-1190	63	5			

Food	Wt. Gms.	Approximate Measure	Pro. Gms.	Fat Gms.	CHO Gms.	Calories	Ca Gms.	P Gms.	Fe mg.	Vitamins					
										A I.U.	Thiamin (B_1) micrograms	Ascorbic Acid mg.	D I.U.	Riboflavin micrograms	Niacin[2]
Onions, fresh, mature	100	2 to 3 small or 1 lg.	1.4	.2	10.3	49	.032	.044	.5	tr.	25-100	7-11		28-62	
Onions, young, green	50	5, 5-1/4" long, 1/2" diam.	1.0	.2	10.6	48	.135	.023	1.2	1800	+	7		+	
Parsley	10	10 av. sprigs	.4	.1	.9	6	.019	.008	.4	3000		10			
Parsnips	100	1/2 large	1.5	.5	18.2	83	.057	.080	.7	tr.	120-190	14-24			
Peas, fresh, shelled	100	1/2 cup, scant	6.7	.4	17.7	101	.022	.122	1.9	1000-1300	270-495	15-25		200-250	
Peas, canned	100	1/2 cup, scant	3.3	.2	10.1	55	.011	.046	2.2	++	200-300	2-10		80-200	
Peas, dried, split	30	1/2 cup, cooked	7.4	.3	18.5	106	.010	.080	1.6	360	90-186	?		75-114	
Peas, dried, whole	30	1/2 cup, cooked	7.1	.4	18.1	105	.022	.119	1.8	360	90-186	?		75-114	
Pepper, green	100	1 empty pod or shell	1.2	.2	5.7	29	.011	.025	.4	875-5000	20-30	90-150		100-140	1.2
Pickles, cucumber	100	1 large, dill or sour	.5	.2	1.9	11	.077	.052	.8			?			
Pickles, Heinz	30	1 small, sweet	.2	.06	10.2	42	.003	.002	.4			?			
Pickles, mixed, sweet	50	1-1/2 tbsp., 9 sm. pcs.	.5	.1	12.5	53									
Pimientos	35	1 aver. canned	.4	1.8	2.2	12				2695		?			
Poke	100	1/2 cup, cooked	2.6	.4	3.7	29	*								
Potatoes, white	100	1 small, boiled	2.0	.1	19.1	85	.013	.053	1.1	30-50	95-165	7-15		40-80	1.5
Potatoes, white	150	1 medium large	3.0	.2	28.7	129	.020	.080	1.7	45-75	143-248	10.5-22.5		60-120	2.3
Potatoes, white French fried	53	10 pieces, 2-1/4" x 1/2" x 1/2"	2.0	8.1	19.1	157	.013	.053	1.1	30	<120	?		<40	1.5
Potatoes, white, chips	15	10 large pieces	1.0	5.5	7.3	83	.005	.021	.4	15	<60	?		<20	+
Potatoes, white, creamed	125	1/2 cup sc., 2 h. tbsp.	4.3	7.8	19.4	165	.095	.108	1.0	376	120	10?	+	173	+
Potatoes, white, mashed	100	1/2 cup sc., 2 h. tbsp.	3.1	7.4	20.7	162	.050	.082	1.2	378	135	12?	+	100	+
Purslane	25	1 aver. salad	.4	.1	.8	6	*			+++	15	4.5-7.5			
Radish, red	10	1, 1" in diam.	.1	.01	.4	2	.004	.003	.1	< 3	5-10	1.2-2.0		3	
Rutabagas	100	1/2 cup, cooked	1.1	.1	8.9	41	.074	.056	.5	25	45	20		93	
Salsify or vegetable oyster	100	2/3 cup, cooked	3.5	1.0	15.5	85	.060	.053	1.2			7.5			
Sauerkraut	50	3/8 cup	.7	.1	2.5	14	.020	.005	1.7	13	< 15	0-5			
Spinach, fresh	100	1/2 cup, cooked	2.3	.3	3.2	25	*	.048	3.4	10000-25000	95-155	15-50		300-400	1.7
Spinach, canned, sieved	100	1/2 cup, scant	2.2	.5	1.5	19	*	.039	1.0	6200	27	13		105	
Squash, fresh, summer	100	1/2 cup, cooked	.6	.1	3.9	19	.015	.015	.4	200-400	42	3		81	
Squash, winter	100	1/2 cup, cooked	1.5	.3	8.8	44	.019	.028	.6	2000-4000	48	3		81	
Sweet potatoes, baked	170	1 large	3.1	1.2	47.4	213	.056	.088	1.4	2550-5950	153-230	<1-25		136-170	
Sweet potatoes, glazed	150	1 medium, 2 halves	3.1	5.3	61.8	307	.070	.090	1.8	5450	153	?		136	
Tomatoes, fresh, red	100	1 medium	1.0	.3	4.0	23	.011	.027	.6	550-1150	70-115	21-24		37-63	
Tomatoes, canned	100	1/2 cup	1.0	.2	3.9	21	.010	.027	.5	.550-	70-115	21-24		37-63	

Food	Gms.	Approximate Measure	Gms.	Gms.	Gms.	Calories	Gms.	Gms.	mg.	A I.U.	Thiamin (B_1) micrograms	Ascorbic Acid mg.	D I.U.	Riboflavin micrograms	Niacin[a]
Apple, baked	115	1 lg., 2 tbsp. brown sugar	.5	.6	43.4	181	.031	.109	1.1	100	< 30	2	-	38-162	
Apple, fresh	100	1 small, 2-1/4" diam.	.3	.4	14.9	64	.007	.011	.3	40-100	20-60	5-8	-	25-108	< .5
Apple, fresh	150	1 large, 3-1/4" diam.	.5	.6	22.4	97	.011	.017	.5	60-150	30-90	7.5-12	-	38-162	< .75
Apple juice	100	1/2 cup scant	.1		12.5	50				+	+	2	-	+	
Apple sauce, sweetened	100	1/2 cup scant	.2	.1	19.7	80	.005	.008	.2	32		2?	-	33	
Apple sauce, no sugar	100	1/2 cup scant	.2	.2	10.9	46	.005	.008	.2	32		2?	-	33	
Apricots, fresh	100	2 to 3 medium	1.0	.1	12.9	57	.015	.024	.5	3000-8000	25-35	1-4	-	105	
Apricots, canned in syrup	100	6 halves, 3 tbsp. J.	.6	.1	21.4	89	.009	.014	.3	3000-8000	15-21	?	-	105	
Apricots and apple sauce	100	1/2 c. (Heinz, strained)	.6	.1	14.4	61	.012	.019	1.3	4100	21	2	-	45	
Apricots, dried	30	4 - 6 halves	1.6	.1	20.1	88	.021	.034	2.3	1800-4500	18-36	.6-3.6	-	72-90	
Avocadoes, Fuerte	100	1/2 of a 4" pear	1.7	26.4	5.1	265	.029	.135	1.4	110	100-200	2-8	-	138	
Avocadoes, West Indian	100	1/2 of a 4" pear	1.3	7.7	7.8	106	.080	.053	?	350	144	12	-	138	
Bananas, fresh	100	1 small	1.2	.2	23.0	99	.008	.028	.6	160-400	60-100	7-8	-	45-80	
Blackberries, fresh	100	2/3 - 1 c., 4 r. tbsp.	1.2	1.1	11.9	62	.032	.032	.9	80-300	< 25	3	-		
Blackberries, canned	100	1/2 cup scant	.7	.7	19.1	86	.019	.019	.5	48-180	< 15	?	-		
Blueberries, fresh	100	1/2 cup	.6	.6	15.1	68	.026	.020	.9	20-80	45	4-10	-	15	
Cantaloupe or Muskmelon [b]	150	1/2 of a 4-1/2" melon	.9	.3	8.9	42	.026	.024	.6	600-3600	75-98	39-51	-	113	
Cherries, fresh	100	20-25 small, 15 large	1.1	.5	17.8	80	.017	.022	.5	15-550	51	8-10	-	180	
Cherries, canned, white	100	1/2 c., 12 lg. (in syrup)	.6	.1	20.8	86	.059	.017	.3	< 35	30	6	-	+	
Cranberries, fresh	100	2/3 - 1 cup	.4	.7	11.3	53	.014	.011	.6	10-70		10-13	-	+	
Cranberry jelly	20	1 tbsp.			13.0	52	tr.	tr.	tr.	+		+	-		
Cranberry sauce	20	1 tbsp.	.02	.06	10.3	42	.001	tr.	tr.	2-6		1-2	-		
Currants, fresh [7]	100	1/2 cup	1.6	.4	12.7	61	.035	.036	.9	400	30-60	15-20	-	+	
Currants, dried	30	2 tbsp.	.7	.2	21.4	90	.023	.041	.8	+		?	-		
Dates, dried	30	3 to 4 stoned	.7	.2	22.6	95	.022	.018	.6	18-90	18-30	-	-	14	
Figs, fresh	100	3 to 4 medium	1.4	.4	19.6	88	.050	.035	.7	60-90	80-100	2	-	82	
Figs, dried	30	1-1/2 - 2 small	1.2	.4	20.2	90	.067	.031	.9	15-35	24-54	-	-	26-38	
Fruit cocktail, canned [8]	120	1/2 cup	.7	.3	26.3	111	.014	.019	.4	493	57	3.6	-	66	
Gooseberries, fresh	100	2/3 - 1 cup	.8	.4	10.1	47	.022	.028	.5	380	150	20-50	-		
Grapefruit, fresh	100	1/2 medium	.5	.2	10.1	44	.017	.018	.3	21	50-100	38-41	-	20-100	
Grapefruit, canned in syrup	100	1/2 cup	.5	.2	13.5	58	.017	.018	.3	21	75	40	-	20-100	
Grapefruit juice, sweetened	100	1/2 cup scant	.4	.1	16.1	67	.010	.017	.2		50-100	30-41	-	20-100	
Grapes, American	100	1 bunch, 22-24 average	1.4	1.4	14.9	78	.017	.021	.6	20-60	30-60	2-3	-	20	
Grapes, green, seedless	100	1 bunch, 60 average	.8	.4	16.7	74						1.2-2.6	-		
Grapes, Malaga or Tokay	100	1 bunch, 22 average	.8	.4	16.7	74				<100			-		
Guavas, fresh	100	2 small	1.0	.6	17.1	78	.015	.016	.3	200	40-55	60-100		88	

Food	Wt. Gms.	Approximate Measure	Pro. Gms.	Fat Gms.	CHO Gms.	Calories	Ca Gms.	P Gms.	Fe mg.	Vitamins					
										A I.U.	Thiamin (B_1) micrograms	Ascorbic Acid mg.	D I.U.	Riboflavin micrograms	Niacin
Kumquats, fresh	100	6 medium	.9	.1	17.1	73						13-24	-		
Lemon juice	100	1/2 cup, scant			8.3	33	.021	.012	.3		30-90	52-60	-		
Lime juice, ripe, fresh	100	1/2 cup, scant	.4		8.3	35	.055	.036		26		16-65	-		
Loganberries, fresh	100	3/4 - 1 cup	1.0	.6	15.0	69	.027	.024	2.1	+		20-48	-		
Mangoes, fresh	100	1 small	.7	.2	17.2	73	.005	.016	.3	1000-2000	40-100	1-83	-	200-260	
Nectarines, yellow	100	2 medium	.9	.1	16.0	67	.004	.024	.5	1000-2000	72	24	-		
Olives, green, A.P.	10	1 medium	.1	1.1	.3	12	.012	.001	.3	39	1		-		
Olives, ripe, A.P.	5	1 small	.1	.8	.1	8	.005	.001	.1	17	tr.		-		
Orange, whole	100	1 medium	.9	.2	11.2	50	.025	.019	.3	50-400	75-145	52-56	-	28-90	
Orange juice	100	1/2 cup, scant	-	-	10.1	40	.025	.019	.3	50-400	75-145	52-56	-	28-90	
Peaches, fresh, yellow	100	1 medium large	.5	.1	12.0	51	.009	.018	.3	1000-2000	20-70	7-10	-	45	
Peaches, canned, in syrup	100	2 halves, 1 tbsp. J.	.4	.1	18.2	75	.009	.014	.2	1000-2000	< 20-70	3-5	-	45	
Peaches, dried	30	2 halves	.9	.2	20.8	89	.018	.036	1.8	450-1800	9-15	0-8	-	45-75	
Pears, fresh	100	1 medium	.7	.4	15.8	70	.013	.016	.3	10-15	30-95	3-5	-	20-150	
Pears, canned, in syrup	100	2 halves, 1 tbsp. J.	.2	.1	18.4	75	.008	.010	.2	10	30	?	-	20-150	
Persimmons, fresh	100	1/2, Japanese, 3" diam.	.8	.4	33.5	141	.022	.021	.3	216-1800		3-53	-		
Pineapple, fresh	100	1/2 to 2/3 cup	.4	.2	13.7	58	.016	.011	.3	40-60	80-125	13-25	-	50-80	
Pineapple, canned in syrup	100	1 slice, 3/4" thick	.4	.1	21.1	87	.010	.007	.2	20-30	63	10	-	20-30	
Pineapple juice	100	1/2 cup, scant	.3	.1	13.0	54	.016	.011	.1	40-60	50-100	5-10	-	20-30	
Plums, fresh	100	3 medium	.2	.2	12.9	58	.017	.020	.5	100-115	48-200	4-7	-	40	
Plums, canned, in syrup	100	2 medium, 1 to 2 tbsp. J.	.4	.1	20.4	84	.010	.012	.3	70	30	?	-	27	
Pomegranate, fresh	100	1/2 of 1 lg., pulp, seeds	1.5	1.2	20.9	100						6			
Prunes, dried	50	4 to 5 medium	1.1	.3	35.5	149	.031	.047	1.8	200-1200	88-113	0-4		25-325	
Prunes, strained, Gerber's	28.35	1 oz., 2 level tbsp.	.3	.7	8.0	35	.006	.007	1.4	175	.18	-	-		
Prunes, sweetened, stewed	100	4 to 5 med., 2 tbsp. J.	1.1	.3	40.5	169	.031	.047	1.8	200-1200	88-113	?	-	25-325	
Pumpkin, canned	100	1/2 cup, scant	1.0	.3	7.9	38	.021	.044	.8	2500	< 150	?	-	100	
Raisins, seeded and seedless	30	1/4 cup	.7	.7	21.4	90	.017	.033	.9	3-30	30-60	-	-	38	
Raspberries, fresh, red	100	3/4 - 1 cup	1.1	.6	14.4	57	.040	.037	.9	130	25	8-15	-		
Raspberries, canned	100	1/2 cup, scant	.6	.5	27.8	118	.024	.022	.5	100	< 19	?	-		
Rhubarb, stewed	100	1/2 cup, sweetened	.5	.1	42.8	174	.051	.025	.5	100	< 25	?	-		
Strawberries, fresh	100	10 large	.8	.6	8.1	41	.022	.022	.9	60-90	< 25	25-50	-	+	
Tangerines	100	1 large, 2 small	.8	.3	10.9	50	.041	.016	.3	350	120	25-50	-	25	
Watermelon	100	1/2 cup, cubes or balls	.5	.2	6.9	31	.007	.012	.2	50-100	30-40	6-8	-	30-40	

Food	Wt. Gms.	Approximate Measure	Pro. Gms.	Fat Gms.	CHO Gms.	Calories	Ca Gms.	P Gms.	Fe mg.	Vitamins					
										A I.U.	Thiamin (B_1) micrograms	Ascorbic Acid mg.	D I.U.	Riboflavin micrograms	Niacin[2]
Apple juice	30	1 oz., 2 tbsp.	-	-	3.8	15				+	+	< 1	-	+	
Grape juice, commercial	30	1 oz., 2 tbsp.	.1	-	5.5	22	.003	.003	.1	+	6	tr.	-	3	
Grapefruit juice, fresh	30	1 oz., 2 tbsp.	.1	.03	2.9	12	.003	.005	.1	6	15-30	11-12	-	6-30	
Grapefruit juice, canned	30	1 oz., sweetened	.1	-	4.8	20	.003	.005	.1	6	15-30	9-12	-	6-30	
Grapefruit juice, canned	30	1 oz., unsweetened	.1	-	3.3	13	.003	.005	.1	6	15-30	9-12	-	6-30	
Lemon juice	30	1 oz., unsweetened	.1	.1	2.4	11	.006	.004	.1		9-27	15-18	-		
Lime juice	30	1 oz., 2 tbsp.	.1	-	2.5	10	.017	.011		8		5-20	-		
Loganberry juice	30	1 oz., fresh or canned	.2	-	3.0	13	.002	.001	.1	+			-		
Orange juice	30	1 oz., 2 tbsp.	-	-	3.0	12	.008	.006	.1	15-120	23-44	15-17	-	8-27	
Pineapple juice	30	1 oz., 2 tbsp.	.1	-	3.9	16	.005	.003	tr.	12-18	15-30	1.5-3	-	6-9	
Prune juice	30	1 oz., 2 tbsp.	.1	-	5.8	23	.003	.006	.9	+		-	-	+	
Raspberry juice	30	1 oz., 2 tbsp.	.1	-	2.5	10	.007	.004	.2		+		-		
Tomato juice	30	1 oz., 2 tbsp.	.3	-	1.3	7	.002	.005	.1	165-345	21-35	6-7	-	11-19	
Tomato juice	100	1-1/2 cup	1.0	.2	4.3	23	.007	.015	.4	550-1150	70-115	21-24		37-63	
Tomato paste, canned	20	1 tbsp.	.7	.2	3.0	17	.007	.018	.4	+	+	?			
Tomato paste, canned conc.	20	1 tbsp.	1.1	.3	4.5	25	.010	.027	.5	+	+	?			
Turnip greens	100	1/2 cup, cooked	2.9	.4	5.4	37	.254	.058	3.5	10000-15700	138-180	20-60		750	
Turnips, root, white	100	1/2 c. cubes	1.1	.2	7.1	35	.051	.032	.5	10-20	65-95	20-30		50-100	
Vegetable juice	100	1/2 c. V-8 Cocktail	.8		4.1	20	.025	.038							
Vegetable marrow	100	1/2 - 2/3 cup	.6	.1	3.9	19	.014	.013	.2		45	4.7-17.8			
Watercress	10	10 average sprigs	.2	.03	.3	3	.017	.004	.3	80-300	10-15	4.3-6.6		15-30	
Yams	170	1 med. large; 1/2 large	3.6	.3	41.0	181						10			

[1] From "Food Values of Portions Commonly Used," by Anna de Planter Bowes, M.A., and Charles F. Church, M.D., M.S., January, 1942, Edition.
[2] Niacin was formerly called nicotinic acid. The units used in this case are milligrams.
[3] Minerals and vitamins were calculated on the basis of 1 ounce of dried navy beans.
[4] Blanched may contain no vitamin A; green may contain 500 I. U. per 50 grams.
[5] Green leafy.
[6] Edible portion of a 4½-inch cantaloupe varies from 100-250 grams.
[7] Ascorbic acid in *black* currants is 150 to 300 milligrams per 100 grams.
[8] Diced peaches, pineapples, grapes, cherries.
[9] Vitamin A in white peaches is 0-100 units per 100 grams.
[10] The composition of seeded and seedless raisins is approximately the same except for iron. Seedless raisins contain 1.2 milligrams iron vs. 2.1 milligrams for seeded in a 30-gram portion of each.
[11] Average serving on rind is 200 grams or more.
* Nutritionally not available.

VICTORY GARDEN COMMITTEE ORGANIZATION

Helen Marshall Eliason, Chairman, Victory Garden Committee, War Services, Pennsylvania State Council of Defense

Victory Garden activities were begun in Pennsylvania almost simultaneously under two auspices, a staff member of The Pennsylvania State College appointed at the suggestion of the United States Secretary of Agriculture, and the State Council of Defense as a part of the Consumer Interests Committee. In order to centralize activities in this field, the leaders of the two groups called a conference on January 22, 1942, for the purpose of making recommendations concerning a State-wide organization. This was done by recommending a Victory Garden Advisory Committee as a part of the organization of the Pennsylvania State Council of Defense.

On recommendations of this conference, in which were represented the State Council of Defense, the State Department of Agriculture, of Public Instruction, of Health, and of Public Assistance, the United States Department of Agriculture State War Board, The Pennsylvania State College, the School of Horticulture at Ambler, the National Farm School, the American Red Cross, Boy and Girl Scouts, various commercial and amateur horticultural associations, the seed trade, the fertilizer trade, and service clubs and organizations, an Advisory Victory Garden Committee was appointed by Dr. A. C. Marts, executive director of the State Council of Defense, with representatives of the agencies and organizations just listed as members, and with Mrs. H. B. Eliason as chairman and Dr. Warren B. Mack as executive secretary. An order was issued by Dr. Marts to County Councils of Defense to set up county and local Victory Garden Committees, which is quoted herewith to explain the composition and general functions of these committees.

ORGANIZATION INSTRUCTIONS FOR 1942

"It is desired that each County Council of Defense should immediately organize a Victory Garden Committee. The chairman should be an active, experienced gardener with executive ability. The members of this committee should be chosen from persons who understand the problems of growing, utilizing, and preserving garden products.

"This County Victory Garden Committee should meet with the County Farm Agent before making any plans whatsoever for the promotion of the Victory Garden Program.

"The County Farm Agent will be in receipt of information from the extension service of The Pennsylvania State College as to the garden products to be raised and as to all the technical details of planning and raising Victory Gardens.

"It is essential that the Victory Garden Program in each county be based squarely upon the specialized and expert knowledge of the County Farm Agent. Seeds and fertilizer are scarce, and without expert guidance, Victory Gardens will waste more good seed and good fertilizer than the products will be worth to the Nation.

"The County Victory Garden Committee should include certain members as follows:

County Supervisor of Vocational Agriculture
County Supervisor of Vocational Home Economics
A representative of the organized garden groups or horticulture associations
A representative of the County Advisory Agricultural Defense Council
A representative of trade organizations which handle seeds, fertilizer, and insecticides
A representative of County War Board, U.S.D.A.
A representative of Consumer Committee of County Councils of Defense, and others

"After the initial meeting of the County Victory Garden Committee, each local Council of Defense should be requested to appoint its Victory Garden Committee composed of the same representative persons as are appointed to the County Victory Garden Committee.

"Kindly report at your earliest convenience, the name of the chairman of your Victory Garden Committee.

"Further information on this subject will be sent you soon."

In 1943, the second season of Victory Gardens, the functions and the organization of county and local Victory Garden Committees were enlarged, and sub-committees on Food Preservation were set up. A part of the order which directed that these sub-committees be set up is quoted below, to explain their constitution and functions.

ORGANIZATION INSTRUCTIONS FOR 1943

"The nation has called for 18,000,000 Victory Gardens in 1943. Pennsylvania's share of this total is 1,400,000 for 1943. Pennsylvania's results in 1942 were 750,000 gardens. This figure places us in the top rank if not leading the nation, and is based on a survey of 80,000 families in Luzerne County, checked by smaller samples throughout the State.

"To reach Pennsylvania's goal of 1,400,000 gardens in 1943, we need a new garden for every old one, and that means an intensive drive for all Victory Garden Chairmen and Committees. This desired increase in gardens will presumably mean more intensive appeal to suburban groups. Victory Garden Chairmen responsible for cities and large towns should now be making a survey of suitable vacant land to be loaned for Victory Gardening. On such land apartment dwellers and city residents not having garden space available could establish individual plots under the direction of the Victory Garden chairman.

Community Gardens in Lancaster, Pennsylvania

Photograph by John A. Fritz, Chairman, Lancaster County Victory Garden Committee

"The enlarged program for 1943 makes it imperative that there be a local Victory Garden chairman in every town in Pennsylvania.

"This year in many sections Victory Garden chairmen will have the opportunity through Defense Councils of availing themselves of the Block Leader system to further the Victory Garden program. With current gasoline and transportation shortages this may prove invaluable.

"When a Victory Garden chairman feels that the demands of the Victory Garden program consume more time and energy than he has opportunity to give, he should request that a vice-chairman or executive secretary be named to assist him.

"It would profit little toward reaching our food goal if we did not also give utmost consideration to canning and food preservation of the summer harvest. Such food conservation will not be touched or deducted from by our rationing system.

"For 1943, a Victory Garden sub-committee on Food Conservation should be appointed. This committee should consist of women who are the ablest leaders in the county and represent such organizations as Church Groups, Parent-Teachers' Associations, Girl Scouts, Farm Bureau, Grange, Federated Club Women, etc.

"As well as home canning and other forms of food conservation for individual use many communities will wish to support the School Lunch Program by community canning projects. The Victory Garden sub-committee on Food Conservation should determine the needs existing in a county and solicit the organization and support of community planning for school lunch, food banks, hospitals, and other non-profit organizations. If this is adequately organized, there should be no loss of surplus vegetables through failure to harvest and conserve from Victory Gardens.

"It is suggested that in each county the supervisor of Vocational Home Economics and the Home Economics extension representative be appointed as advisers to the Victory Garden sub-committee on Canning and Food Preservation so there will be no lack of technical information.

"Victory Garden committees must stand ready to supply accurate, easily comprehended information on gardening, soil selection and care, cultivation, insect and disease control, and canning and other conservation measures. Some of the demand for such information can be met by holding meetings at which one or more qualified persons could present topics of special interest and answer questions that may arise; much can be supplied in the form of printed pamphlets which are provided by the Agricultural Extension Service of

The Pennsylvania State College. The land-grant colleges in other states have material especially suited to the needs of the state.

"All of the publications of the Extension Service are obtainable from the Agricultural Extension Representative in the county, popularly called the County Agent. Copies may be obtained in quantity from the County Agent by Victory Garden Committees, for distribution among all gardeners desiring this information.

"Circular letters, designed chiefly for rural and farm gardeners, but useful for others, will be available for distribution from the office of the County Agent and will be sent from that office to individuals or lists of persons whose names and addresses are sent by Victory Garden Committees.

"As for meetings, the County Agricultural and Home Economics Extension Representatives and the Extension Specialists in vegetable gardening, soil management, and disease and insect control are available as speakers, as far as their time permits. Speakers for series of meetings should be chosen among other qualified persons, such as vocational agriculture or home economics high school supervisors, and experienced commercial or home gardeners with speaking ability. The County Agent usually is acquainted with such persons and will be glad to make suggestions on this and all other phases of garden information. Victory Garden Committees will find his advice very helpful in planning the entire program."

Certain county and local Victory Garden Committees added additional sub-committees, and these were brought to the attention of other Committees throughout the State, to be adopted, applied with modifications, or not, as local conditions seemed to make advisable. One plan of sub-committee organization thus brought to the attention of other Committees on March 3, 1943 (Bulletin No. 32C), was that evolved in Blair County, where Mr. Glenn Bressler is Chairman. The sub-committees set up were the following, with their respective functions:

1. **"Sub-committee on Procurement of Land.**
   This sub-committee will advise gardeners on the suitability of land for gardening and will compile a list of plots available for allocation to gardeners who do not have suitable land at their own disposal.

2. **"Sub-committee on Registration, Assignment of Plots, and Soil Preparation.**
   This sub-committee will register all Victory Gardeners, particularly those desiring land for gardens, will assign plots, and will advise and assist in preparation of land for planting.

3. **"Sub-committee on Insect and Disease Control and Succession Cropping.**

This sub-committee will stimulate interest and activity in these phases and will bring together information thereon.

4. **"Sub-committee on Conservation and Canning.**

This sub-committee will promote conservation of products and bring together information on this subject."

The most recent instructions on organization of the Victory Garden program in Pennsylvania, which completes this organization as it is functioning at present, was the following:

OFFICIAL NAME OF VICTORY GARDEN CONSERVATION CENTERS

"The official name of any centers where conservation of Victory Garden products may be effectuated for community or individual use is—**The Victory Garden Food Conservation Kitchen.**

ORGANIZATION—STATE AND REGIONAL

Canning and Conservation

"The State has been divided into three regions to facilitate the food conservation program.

The counties included in each of the three regions are as follows:

Eastern—Philadelphia, Delaware, Chester, Montgomery, Lancaster, Lehigh, Berks, Bucks, Northampton, Monroe, Pike, Wayne, Susquehanna, Bradford, Dauphin, Lackawanna, Lebanon, Wyoming, Sullivan, Luzerne, Carbon, Columbia, Montour, Northumberland, and Schuylkill.

Central—York, Adams, Cumberland, Perry, Juniata, Snyder, Union, Lycoming, Tioga, Potter, Clinton, Centre, Mifflin, Huntingdon, Franklin, Fulton, Bedford, Blair, Somerset, Cambria, Clearfield, Cameron, McKean, Elk, Indiana, and Jefferson.

Western—Fayette, Westmoreland, Armstrong, Clarion, Forest, Warren, Venango, Erie, Crawford, Mercer, Lawrence, Butler, Beaver, Allegheny, Washington, and Greene.

"The regional chairmen are directly responsible to the Victory Garden Committee of the State Council of Defense.

ORGANIZATION—COUNTY AND LOCAL

"The chairmen of the **Sub-Committee on Food Conservation** of counties and localities within the county, as has been stated previously, must be members of a county or local Victory Garden Committee, and they **must function in this capacity solely,** when assuming the responsibility of the Food Conservation Committee chairmanship.

"The chairman should be a volunteer worker, who will devote her time for the next several months **primarily** to the Food Conservation program. Professionally or commercially employed home economists should be encouraged to assist with the program as members of the Food Conservation Committee; **but they should not be made chairmen of the committees.**

"Any county or local organization may co-operate in the Victory Garden Food Conservation program; but none should be permitted to take over the program. The Victory Garden Committee of the State Council of Defense has been officially designated as the sponsor of a State-wide Victory Garden Food Conservation program.

"It is intended that personnel, equipment, and other help be given by the State Council of Defense to the respective communities, and further that a unified, strong food conservation program be carried out in every county of the Commonwealth.

EQUIPMENT, PERSONNEL, AND FINANCIAL SUPPORT OF VICTORY GARDEN FOOD CONSERVATION KITCHENS

"The State Council of Defense is assuming the financial responsibility for the purchase of canning retorts which will be loaned to the different counties for the duration of the war, and for the employment of conservation kitchen supervisors who will serve either full or part time in the different counties of the state, during the canning season. These aids to the Victory Garden Food Conservation program will be supplied to all counties which are fully organized in accordance with the recommendations issued by the State Council of Defense to the County and Local Victory Garden Committees. The retorts have a 33-jar capacity. They are already manufactured. Since December the State Council of Defense has been working to obtain retorts or pressure cookers, and now the order is in the hands of the War Production Board, awaiting final approval which it is hoped will be forthcoming immediately.

"County and local committees must arrange for all local expenses of operation of the kitchens, such as fuel, salt, lighting, water supply and waste disposal, necessary travel of the supervisor, and other similar expenses. Jars, sugar, jar tops and rings, and other supplies for preserving foods for community use must be furnished by local agencies; similar supplies for family use should be brought by the housewives themselves.

"Fire houses, halls of Granges and fraternal orders, kitchens of Sunday Schools, and the like are preferable to school kitchens as Victory Garden Food Conservation Kitchens, because the latter will not remain fully available throughout the canning season, after the resumption of school in September.

"The State Victory Garden Committee anticipates that the Food Conservation kitchens will provide ideal conditions under which Victory Gardeners in towns and suburban areas particularly will be able to reduce spoilage and other difficulties (including shortage of equipment, inefficient use of fuel, and over-heating of living quarters) encountered by relatively inexperienced home canners."

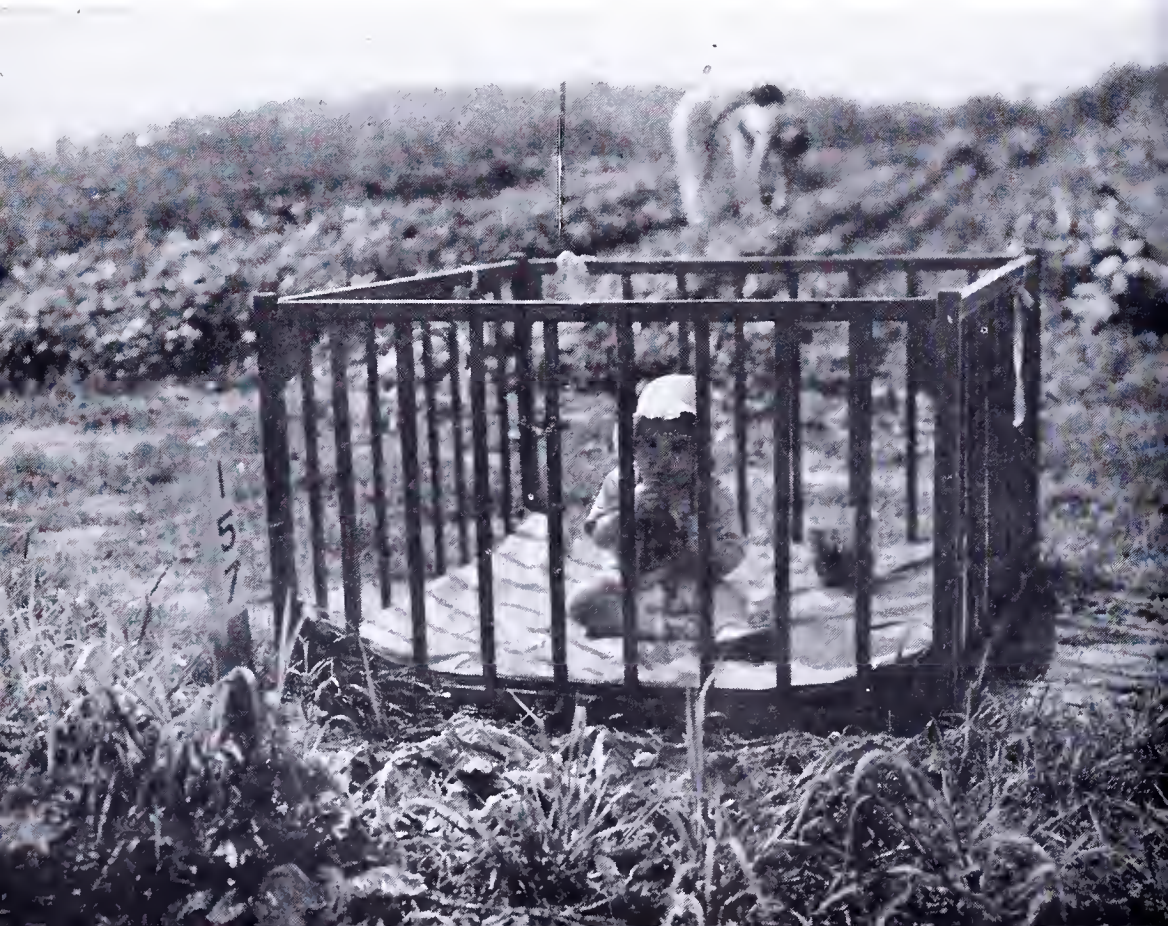
FIFTEEN STEPS FOR THE INDIVIDUAL VICTORY GARDENER TO FOLLOW

1. Obtain from your county agricultural or home economics extension representative information on amounts and kinds of vegetables needed for best nutrition of the family; quantities of seed required; best varieties for different localities, seasons of the year, and uses; time to plant; planting distances; fertilizers; and pest control measures.
2. Draw a plan of your garden preferably to scale with a ruler, showing location of each row and the distances between rows, as well as planting dates.
3. Co-operate with others in your locality in buying seed, tools, and supplies. Seed is more economically purchased in weighed or measured quantities, rather than in small packets, as are fertilizers and insecticides; a single set of garden tools can serve a number of small gardens.
4. Choose a soil which is fertile, well-drained, medium in texture—not too sandy, because such soils require much fertilizer and frequent watering, nor too clayey, because clay soils are hard to work and are unfavorable to many vegetables—and of which the darker top-soil is at least eight inches deep. Avoid thin soils or those that have been eroded, as well as those which have been filled in or have been idle for several years. If you are inexperienced, consult your county agent or your supervisor chosen by the local Victory Garden Committee.
5. Choose a site which is reasonably level and well exposed to sun and air movement. One might not recommend the latter in Western Kansas or Oklahoma, but in the humid Northeastern States good air circulation is desirable.
6. Find out the lime requirement of your soil. Your county agent can test this for you. Apply the amount of lime required. For soils with a considerable lime requirement it is the cheapest fertilizer.
7. Co-operate with others in having plants for early transplanting grown by experienced plant growers. A few plants can be grown in window boxes, but the chances of having healthy, sturdy plants are better if they are grown in hotbeds or greenhouses by those who know how to do it.

8. Clean up rubbish and especially any large, thick-stemmed weeds which may be present in your garden or near it. This step will reduce the population of certain pests next summer.
9. Spade or plow your garden deeply and well, incorporating any suitable organic matter or humus-making material into the soil. Compact the soil after spading or plowing, by breaking clods or by rolling, harrowing, or raking. Fertilizers and lime also may be spaded in, though they may be broadcast on the surface and raked in.
10. Plant straight rows, using a stretched string for accuracy, and marking the distances carefully. Observe proper planting depths. Keep ahead of the weeds and of insect pests.
11. Water if possible when the soil becomes dry, applying enough to dampen the soil to a depth of at least six inches, which had best be ascertained by digging to see. Most home gardeners do not apply enough water to be of any value; about three quarts are required to the square foot to moisten a moderately dry soil to a

While Mother and Father Work in the Victory Garden, Daughter Enjoys the Sunshine and Peeks at the Photographer. This is one of the Westinghouse Educational Center Gardens, 1943.

Photograph by B. P. Hess, Westinghouse Electric and Manufacturing Company, Pittsburgh, Pennsylvania



depth of six to eight inches. At this rate about 900 gallons would be needed for one watering of a garden 35 feet square.

12. Take the best possible care of fruit trees, grape vines, and bushes on your home property. For the emergency, this is more important than planting new ones. Plant new fruit plants for the future, mainly to show your optimism for that future.
13. Obtain information on cooking, drying, and preservation of vegetables and fruits from your county home economics extension representative; on home storage, from your county agent.
14. In small gardens, give place to the vitamin-rich, leafy vegetables, to those which may be planted closely and produce abundantly, and to those which lose rapidly in edible quality and nutrient content during commercial handling. See pages 51 and 52.
15. Keep in touch with your local Victory Garden Committee and make full use of its services. Be willing to report promptly all information asked by these committees.

PLANS TO FIT YOUR VICTORY GARDEN AND TO SUPPLY THE NUTRIENT REQUIREMENTS OF YOUR FAMILY

To assist Pennsylvania's expected 1,540,000 Victory Gardeners, many of whom will have only small plots of ground available, the Advisory Victory Garden Committee of the State Council of Defense has prepared diagrams (shown on pages 51 to 55) for two miniature-size city gardens (15 x 11 and 15 x 20) and three medium-size suburban or community-plot gardens (20 x 25, 30 x 30, and 35 x 35). The diagrams are drawn in exact scale, showing position of rows, number of inches between rows (noted in left margin), the recommended vegetables to plant, and planting dates for Pennsylvania.

The vegetables recommended were chosen on the basis of maximum nutritional values and the degree of prospective shortages this year. The small garden does not have room for vegetables grown just for energy value or for personal taste, it was pointed out, unless these happen also to be the most nutritious. However, some substitutions may be made if they do not alter the basic plan.

The nutrients provided by the various vegetables recommended in the three diagrams are:

Protein: Beans (green), Beans, (lima), Beans (soy), Beet greens, Broccoli, Corn (yellow, sweet), Kale, Mustard greens, Peas, Turnip greens.

Calcium: Beans (green), Beans (soy), Beet greens, Broccoli, Chard (Swiss), Kale, Mustard greens, Turnip greens.

Iron: Beans (green), Beans (soy), Beet greens, Broccoli, Chard (Swiss), Chives, Endive, Kale, Mustard greens, Parsley, Peas, Spinach.

Pro-Vitamin A: Beans(green), Beet greens, Broccoli, Cabbage (outer green leaves), Cabbage (Chinese), Carrots, Chard (Swiss), Chives, Corn (yellow, sweet), Endive, Kale, Lettuce, Mustard greens, Parsley, Peppers (green), Spinach, Tomatoes, Turnips (yellow), Turnip greens.

Vitamin B_1 (Thiamin): Beans (green), Beans (lima), Beans (soy), Beet greens, Broccoli, Cucumber, Kale, Mustard greens, Onions, Peas, Spinach, Tomatoes, Turnip greens.

Vitamin B_2 (Riboflavin): Beans (green), Beans (lima), Beans (soy), Beet greens, Broccoli, Cabbage, Cabbage (Chinese), Carrots, Chard (Swiss), Corn (yellow, sweet), Cucumber, Endive, Lettuce, Mustard greens, Onions, Peas, Radish, Spinach, Tomatoes, Turnips (yellow).

Vitamin C (Ascorbic Acid): Mustard greens, Pepper (green), Cabbage (green), Turnip (white), Tomato (red), Cabbage (Chinese), Turnip greens, Spinach, Potato (white), Onions (young green), Endive (curled), Water cress, Carrot.

Niacin: Beans (green), Beans (lima), Beans (soy), Beet greens, Broccoli, Cabbage, Cabbage (Chinese), Endive, Mustard greens, Peas, Spinach, Tomatoes, Turnips (yellow), Turnip greens.

The data on pages 21 to 24 and 30 to 32, and in Table IV, page 49 give further information on the nutritional value of vegetables.

All first plantings except New Zealand spinach, beans, (including soybeans), tomatoes, and peppers should be planted as soon as soil can be prepared; these should be planted after all danger of killing frost is past, or about May 15 in most parts of the state. Onions should be planted as sets; cabbage, head lettuce, peppers, and tomatoes as transplants which may be grown in flats or pots in advance of the season, or may be purchased locally. Outer leaves of Swiss chard are cut for use when large enough, leaving the plant to produce throughout the season. Leaf lettuce may be cut in the same way to prolong its season of use, if heads are not desired.

Table V gives the basis for calculating the desirable allotment of space to major groups of vegetables, based on the size of the family. The yields given in the table are average Pennsylvania yields. Similar plans may be drawn by those in other states by consulting with the State Department of Agriculture or the County Farm Agent of your county about yields of major vegetables in your locality.

Take a pencil, check the family members on this table, add the length of row of the major groups of vegetables required, and then you are ready to plant for the family's entire needs.

TABLE IV

APPROXIMATE CONTRIBUTIONS TO THE DAY'S NEEDS OF CERTAIN NUTRIENTS SUPPLIED BY ONE STANDARD PORTION OF MAJOR VEGETABLES

	Protein	Calcium	Iron	Carotene (Pro-Vitamin A)	Thiamin (Vitamin B_1)	Riboflavin (Vitamin B_2)	Niacin	Ascorbic Acid (Vitamin C)
Beans, lima	3	4	3		3	3		2
Beans, soy	1	4	2	4	2	3	3	2
Beans, string (snap)	4	4	3	3	4	4		2
Beet	4	4	4	4	4	4	4	4
Beet greens	4	3	2	1	2			2
Broccoli	4	3	3	2	4	4		1
Cabbage	4	4		4	4	4		1
Cabbage, Chinese				3	3	3	4	3
Carrot		4	4	1	4	4	4	4
Chard, Swiss		4	3	1		4		3
Corn, sweet (yellow)				3	2	2	4	4
Endive		4	4	3	4	3		4
Kale		2	3	1	3	3		1
Lettuce, head								3
Lettuce, leaf		4	4	3	4	4		4
Mustard greens		2	2	1	4			
Onions, green		4	4	2	4			4
Onions, mature bulb	4	4	4		4	3		3
Parsley		4	4	1				3
Peas		4	3		3	3		2
Peppers			4	1	4	4	4	1
Potatoes, sweet	4	4	3	2	3	4		2
Radishes					4	4		4
Squash, summer				4	3	3		
Squash, winter	4	4	4	2	4	4		
Tomatoes			4	3	4	4		2
Turnips, yellow				4	3	2		3
Turnip greens		2	2	1	3	2		3

Key: The vegetables marked 1 are those of which one standard portion, if eaten raw or properly prepared, supplies approximately one-half of the amount of that nutrient needed by an average adult. Those marked 2 will supply between $\frac{1}{4}$ and $\frac{1}{2}$. Those designated 3 will supply between $\frac{1}{10}$ and $\frac{1}{4}$. Those marked 4 will give at least $\frac{1}{10}$ of the day's requirement in a standard portion. Not many vegetables have yet been analyzed for niacin. No doubt larger amounts of this vitamin exist in some of these vegetables than are yet known.

TABLE V
VEGETABLES TO GROW FOR EACH MEMBER OF THE FAMILY YEARLY, IF GARDEN SPACE IS UNLIMITED

Family Member to be Served From the Garden	MAJOR GROUPS OF VEGETABLES REQUIRED FOR A YEAR															
	Dry Beans, Soy Beans, Peas (Best vegetable source of protein & of many vitamins—particularly the B vitamins. These can be used instead of some of the meat in the diet.)		Leafy and Green Vegetables (Good sources of many vitamins and minerals, particularly vitamin A and the B vitamins; also iron)		Yellow Vegetables* (High vegetable source of carotene or provitamin A. This is converted in the body to Vitamin A.)		Potatoes and Sweet Potatoes (Best vegetable source of energy. With skins, they supply small amounts of many minerals and vitamins. Sweet potatoes are a good source of vitamin A.)		Tomatoes (Excellent vegetable source of vitamin C; also contains some vitamin A and other vitamins, as well as some minerals.)		Cabbage (Excellent source of vitamin C; also contains minerals and other vitamins in small amounts.)		Other Vegetables (Make many miscellaneous contributions to all parts of the dietary.)	
	Lb.	Ft. of Row	Lb.	Ft. of Row	Lb.	Ft. of Row	Lb.	Ft. of Row	Lb.	Ft. of Row	Lb.	Ft. of Row	Lb.	Ft. of Row
Average Man	33	640	122	270	60	128	182	440	130	144	52	55	104	175
Average Woman	16	310	156	345	60	128	156	375	130	144	52	55	90	135
Boy 20-16 Years	33	640	138	305	70	149	234	575	130	144	52	55	165	248
Boy 15-13 Years	16	310	138	305	70	149	182	440	117	128	52	55	150	225
Girl 20-16 Years	13	250	143	315	60	128	130	300	104	113	52	55	120	180
Girl 15-13 Years	16	310	143	315	60	128	156	375	104	113	39	42	90	135
Child 12-10 Years	13	250	137	300	60	128	130	300	78	85	39	42	104	175
Child 9-7 Years	10	195	122	270	60	128	104	250	78	85	33	36	90	135
Child 6-4 Years	3	60	86	190	44	94	91	220	65	72	33	36	52	80
Child 3-1 Years	0	0	69	150	35	75	65	160	52	56	33	36	35	55
Child 12-9 Months	0	0	52	115	26	55	52	125	40	44	0	0	15	23

* Not including sweet corn.

BASIC GARDEN PLAN

The plan of the Victory Garden should be based on the nutrient requirements of the family. The accompanying table presents a basic plan for estimating the vegetable needs of the family. A plot 35 by 35 cannot supply the family's needs for a year, so the vegetables recommended for that size of garden include those which take the place of meat to some degree and those which supply considerable minerals and vitamins.

The data given in connection with the basic garden, more extensive than that suggested for each of the gardens for which diagrams are drawn, may be used to ascertain preferred varieties, planting, and other data for gardens of other sizes. As mentioned previously, the data in Table V, page 48, on the garden of unlimited size may be used for the smaller garden.

MINIATURE GARDENS—15 x 11 and 15 x 20 FEET

The smaller the Victory Garden, the greater the care which should be exercised in planning its contents. Space as small as 15 x 20 feet, or even 15 x 11, can be made to yield a rich return in nutrients which are scarce on the market and which the family must have in order to be in the best of physical well-being.

The smaller the garden the greater should be the space allotted to the green, leafy vegetables—high in many nutrients; the yellow vegetables—high in pro-Vitamin A; and the high carriers of Vitamin C—tomatoes and cabbage, chiefly.

These vegetables are highest in their yield of minerals and vitamins of any vegetable groups, and they have been stressed in the committee's diagrams for Miniature Gardens.

MEDIUM-SIZED VICTORY GARDENS—25 x 20, 30 x 30, and 35 x 35 FEET

Since it is evident that a family cannot supply all of its vegetable needs for the year in a plot of 35 x 35 feet, vegetables recommended for this plot are those which will give the highest possible yield of protein, vitamins, and minerals. The Medium Garden diagrams provide the maximum of those vegetables which take the place of meat in some degree and which supply minerals and vitamins badly needed in the dietary.

PLANS FOR GARDENS OF VARIOUS SIZES

It should be remembered that the plans shown above are suggestions only; they may be varied to suit the tastes of the family members as well as the length of the growing season, type of soil, and other local conditions. Additional suggestions may be found in publications of the respective State Councils of Defense in states other than Pennsylvania, and from your county farm agent.

TABLE VI

INFORMATION CONCERNING A BASIC GARDEN. THESE DATA MAY BE APPLIED TO GARDENS OF DIFFERENT SIZES

Distance Between Rows, Inches (1)	Kind of Vegetable and Order of Planting	Preferred Variety (2)	Seed or Plants Required for Row (or Part Indicated)	Depth to Sow Seed, Inches	Distance Between Plants in Row, Inches	Planting Date (3)	Harvest Time	Average Yield
6	*Onion Sets*	Ebenezer	½ Pint Sets	1	3	April 15	Young Onions May 15	——— (4)
(Midway between onion rows)	*String Beans*	Tendergreen	¼ Pound	1	3	June 15	August 5 - 15	2 pecks
15	Onion Seed or Plants	Utah Valencia	75 plants	1	4	April 15	Mature bulbs August 1	3 pecks
15	*Leaf Lettuce*	Grand Rapids or Black Seeded Simpson	1/20 ounce	½	8 (for full grown plants, closer for young lettuce)	April 15	May 15 to June 5	——— (4)
(Midway between lettuce and mustard rows)	*Late Cabbage*	Penn State Ballhead	16 plants	Transplant	18	June 15	October 1	14 heads
15	*Mustard Greens* ½ row	Fordhook or Evergreen	1/32 ounce	½	4	April 15	May 20	——— (4)
	Radishes ½ row	Scarlet Globe or White Icicle	1/10 ounce	½	2	April 15	May 15	——— (4)
15	*Beets*	Crosby or Detroit Dark Red	¼ ounce	¾	3	April 15	June 15	1 peck
(Midway between beet & carrot rows)	*Kale*	Dwarf Curled Scotch	¼ ounce	½	12	July 15	September 15	——— (4)
15	*Carrots*	Red Core Chantenay or Nantes	⅛ ounce	½	2 - 3	April 15	June 25	1 peck
24	*Cabbage*	Golden Acre and Marion Market	16 plants	Transplant	18	April 15	July 15	14 heads
	Interplant with *Head Lettuce*	White Boston	16 plants	Transplant	18	April 15	June 15	12 heads
	Follow with *Yellow Turnips*	Golden Ball	1/16 ounce	½	3	August 1	October 5	1 peck
24	*Swiss Chard* 10′ row	Fordhook Giant	10 plants	¾	12	April 15	June 15	——— (4)
	Parsley 3′ row	Moss Curled	9 plants	Transplant	4	April 15	June 15	——— (4)
	Peppers 12′ row	California Wonder	6 plants	Transplant	24	May 15	August 5	1½ pecks
24	*Dwarf* Double	Little Marvel or	½ Pound for					
6	*Peas* row	Thomas Laxton	2 rows	1	2	April 15	June 15	2 pecks
	Followed by *String Beans* (1 row)	Tendergreen or Round Pod Kidney	¼ Pound	1	3	July 1	September 15	1 peck
30	*String Beans*	Round Pod Kidney	¼ Pound	1	3	May 10	July 10	1 peck
	Followed by *Endive* or *Chinese Cabbage*	Green Curled or Broad Leaf	26 Plants	Transplant	8	August 1	September 20	32 Heads
		Chihli	¼ Ounce	½	12	August 1	September 20	20 Heads
30	*Edible Soy Beans*	Bansei, Giant Green	¼ Pound	¾	3	May 10	August 15	1 Peck
30	*Lima Beans*	Fordhook	¼ Pound	1	6	May 15	August 10	1 Peck
36	*Tomatoes*, Staked	Rutgers	10 Plants	Transplant	30	May 15	July 25	5 Pecks
15 To edge of garden								

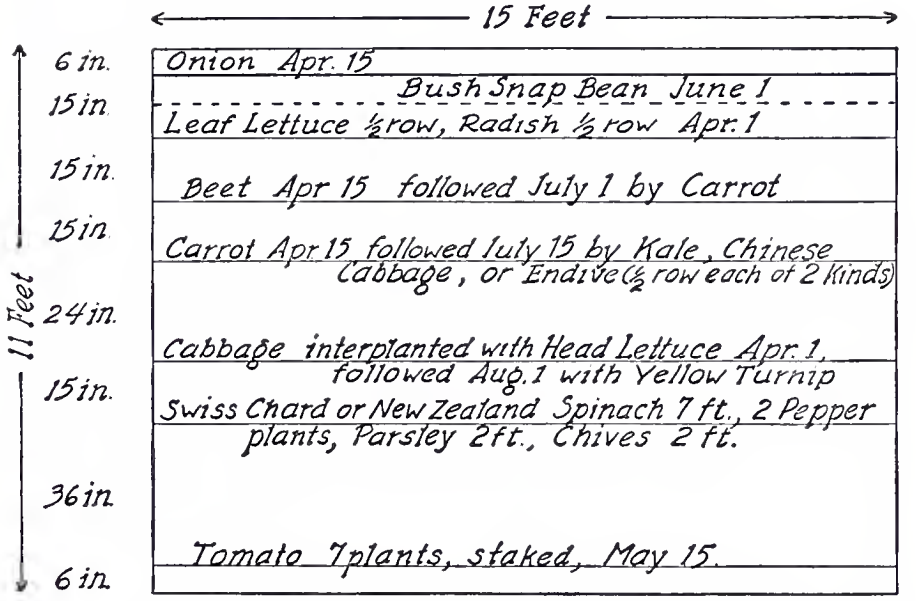
(1) Allow 6 inches from edge of garden for vegetables requiring small space; 12 to 18 inches for larger kinds.

(2) Other varieties may be satisfactory; ask your local Victory Garden Committee Chairman if preferred varieties are not available.

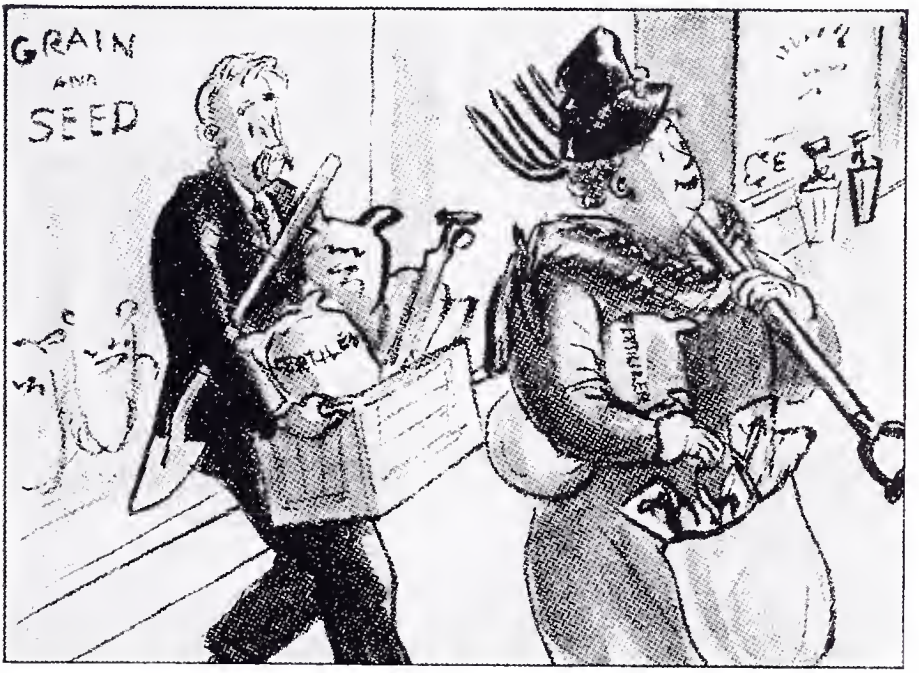
(3) Average planting date for Central Pennsylvania; for southeastern section, planting time may be 1 to 2 weeks earlier for first planting.

(4) Depends upon size at harvest.

MINIATURE VICTORY GARDENS



Suggested Plan for Miniature Garden, 15 by 11 Feet, Compiled by the Victory Garden Committee. War Services, Pennsylvania State Council of Defense



—Reprinted from Life

A Don't For Victory Gardeners—Don't Start More Than You Can Finish

15 Feet

20 Feet

6 in	Onion Apr. 15
12 in	Bush String Bean June 15
12 in	Onion Apr. 15
12 in	Leaf Lettuce Apr 15
12 in	Bush String Bean June 15
15 in.	Mustard Greens ½ row, Radishes ½ row Apr 15
15 in.	Beet Apr 15 followed July 1 by Carrot
24 in.	Carrot Apr 15 followed July 15 by Kale
24 in.	Cabbage 10 plants interplanted with Head Lettuce Apr. 15, followed Aug 1 by Yellow Turnip.
24 in.	Swiss Chard 7 ft., 2 plants Green Pepper May 15, 2 ft. Parsley, 2 ft Chives.
24 in.	Dwarf Pea Apr. 15, followed July 1 by String Bean
24 in.	Bush String Bean May 10 followed Aug 1 by Endive
36 in.	Edible Soy Bean May 10
12 in.	Tomato 7 plants May 15

Suggested Plan for a Miniature Garden, 15 x 20 Feet, Compiled by the Victory Garden Committee, War Services, Pennsylvania State Council of Defense

MEDIUM-SIZED VICTORY GARDENS

20 Feet

25 Feet

15 inches	Staked Tomatoes
3 ft.	Staked Tomatoes
3 ft.	Swiss Chard
2 ft.	Onion Sets followed by 1 Row of
15 in.	Onion Sets Cabbage Plants
15 in.	Beets followed by 1 Row
15 in.	Beets Snapbeans
15 in.	Carrots — follow with late Lettuce
15 in.	Carrots — follow with late Lettuce
15 in.	Kohl-Rabi — follow with late Beets
15 in.	Lettuce — follow with late Carrots
18 in.	Peas — follow with Kale
2 ft.	Peas — follow with Broccoli
2 ft.	Snapbeans — follow with Chinese Cabbage
$1\frac{1}{2}$ ft.	Snapbeans — follow with Turnips

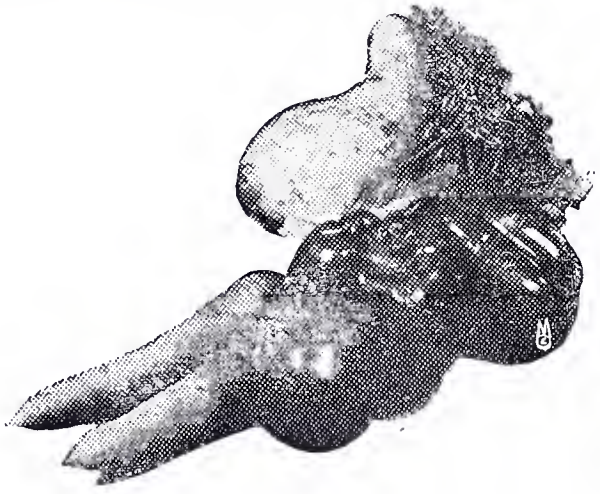
Suggested Plan for Medium-sized Garden, 20 x 25 Feet, Compiled by John A. Andrew, Jr., School of Horticulture, Ambler, Pennsylvania

30 Feet

30 Feet

1 Foot	Sweet Corn
30 in.	Sweet Corn
30 in.	½ Row Swiss Chard | ½ Row Radishes followed by Peppers
24 in.	Beets followed by Kohl-Rabi
15 in.	Beets " " Kohl-Rabi
15 in.	Carrots " " Spinach
15 in.	Carrots " " Spinach
15 in.	Onion Sets " " Endive
15 in.	Onion Sets " " Lettuce
15 in.	Onion Sets " " Lettuce
15 in.	Lettuce " " Late Beets
15 in.	Lettuce " " Late Beets
2 ft.	Peas " " Kale
2 ft.	Peas " " Chinese Cabbage
2 ft.	Peas " " Sweet Corn
18 in.	Spinach } followed by 1 Row Sweet Corn
18 in.	Spinach } or 2 rows Carrots
18 in.	New Zealand Spinach { Summer Savory | Parsley
18 in.	{ Summer Savory | Parsley followed by Late Radishes

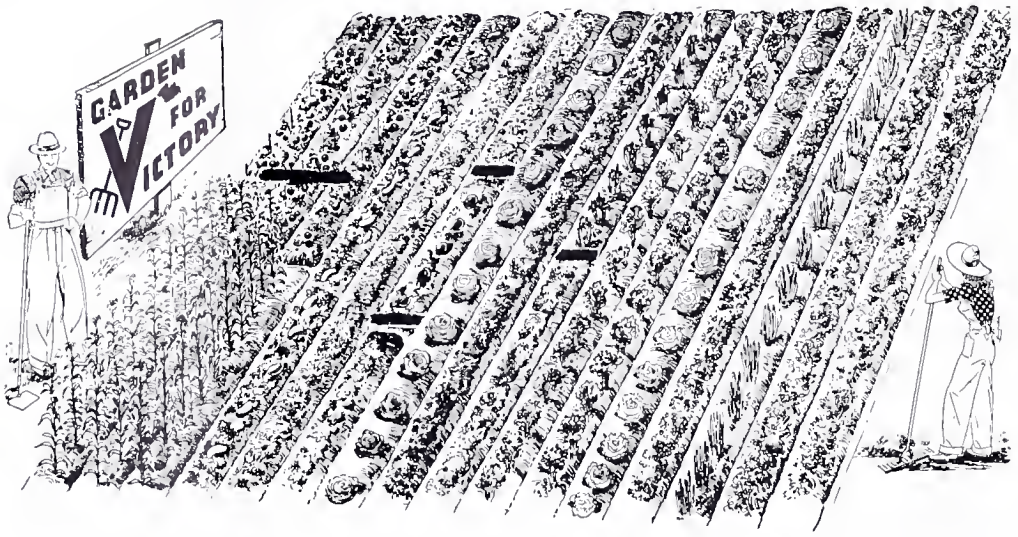
Suggested Plan for a Medium-sized Garden, 30 x 30 Feet, Compiled by John A. Andrew, Jr., School of Horticulture, Ambler, Pennsylvania



35 Feet

6 in	Onion Apr. 15
2 in	Onion Apr. 15 — Bush String Bean. June 15
in	Leaf Lettuce ⅓ row, Turnip Greens ⅓ row, Spinach ⅓ row Apr. 15
in	Mustard Greens ½ row, Radish ½ row, Apr. 15 — Bush String Bean. June 15
in	Beet Apr. 15 followed July 1 by Carrot
in	Carrot Apr. 15 followed July 15 by Kale ½ row, Broccoli ½ row
4 in	Cabbage interplanted with Head Lettuce ½ row, Early Endive ½ row, followed Aug 1 by Yellow Turnip.
4 in	Swiss Chard 7 ft., New Zealand Spinach 6 ft., Parsley 2 ft., Chives 2 ft., Pepper 6 ft., Cucumber 12 ft.
4 in	Pea, double row earliest Apr. 15 followed June 25 by Late Cabbage
in	
4 in	Pea, double row second early Apr. 15 followed July 1 by Bush String Bean
6 in	
4 in	Bush String Bean May 10 followed Aug 1 by Endive ½ row, Chinese Cabbage
4 in	Edible Soy Bean May 10
0 in	Bush Lima Bean May 15
6 in	Sweet Corn ½ row early, ½ row midseason, May 10
6 in	Sweet Corn ½ row early, ½ row midseason, May 10
6 in	Tomato, staked, May 15
2 in	Tomato, staked, May 15
2 in	

Suggested Plan for a Medium-sized Garden, 35 x 35 Feet, Compiled by the Victory Garden Committee, War Services, Pennsylvania State Council of Defense. Gardens designed for different sizes of plots may be adapted from Tables V and VI, giving information for a garden of unlimited size, and for a basic garden, respectively.



STEPS IN GARDEN ORGANIZATION

COMMUNITY GARDENS

One of the most important duties of the local Victory Garden Committee in suburban or urban areas is to enable families who so desire to obtain suitable land and other facilities for growing at least a part of their own vegetable supply. If other activities make it inadvisable for the committee as a whole to undertake this, a sub-committee on procurement and preparation of land may be set up to discharge this function, as explained previously.

VACANT LOT GARDENING

In most American towns and cities, numerous vacant lots may be found in all except the most congested areas. These may be examined by qualified members of the Committee or others designated by them to determine the suitability of such lots for vegetable growing; the owners should be consulted, and a list of lots, with their locations and the names and addresses of their owners should be compiled. Families then are assigned to lots which are most conveniently located, among those of suitable area in proportion to the size and requirements of the particular families.

In order to attain the greatest possible efficiency in the utilization of facilities, it may be advisable for the committee to arrange for the plowing, harrowing, liming, manuring if manure is locally available, and fertilizing of plots. Families which are assigned to the respective plots are charged the costs of these services.

Contracts should be drawn between the owners of lots and responsible members of the respective families assigned to them, for their mutual protection. A common form of contract may be provided by the committee, prepared with competent legal advice, which in-

sures to the family the ownership of the vegetables produced and protects the owner against damage to his property. Suitable rentals of the land may be included in the contract, though many vacant lot owners will not exact rental charges.

In Allentown, Pennsylvania, a Vacant Lot Gardeners' Association has been organized, to promote this type of gardening and to advance the interests of those who participate in it. Such associations might well be formed in other towns and cities, and be assigned the functions of the Victory Garden Sub-Committees with respect to the organization and maitenance of vacant lot gardening as a community activity.

COMMUNITY PLOTS ON AN ALLOTMENT BASIS

Another type of community Victory gardening to which consideration should be given by committees is the renting of larger areas of suitable land, located conveniently with respect to public means of transportation, which may be allotted in parcels or plots to families. Parcels may be all of the same size, for convenience in laying out walks; for larger families, two or more adjacent plots may be assigned, in proportion to the requirements of the respective families.

In connection with community gardens of the foregoing character, community services similar to those suggested for vacant lot gardens become doubly advisable, because of greater savings in costs and greater increases in efficiency which may be effectuated. In addition, sheds should be provided, with lockers for garden tools and supplies, or even with community tools which may be checked out to individual gardeners. Such a provision eliminates the necessity for gardeners to carry tools back and forth from their homes to the gardens, and greatly increases the convenience of caring for the gardens. The costs of these services of course should be pro-rated among the families participating in the community enterprise.

SUPERVISION SHOULD BE PROVIDED

It is highly desirable that capable supervision of large community garden areas be provided, preferably on a volunteer basis. The committee should ascertain the extent of experience in gardening among the patrons of community plots as well as among other persons interested in the project, and competent persons should be designated as supervisors, to be available for consultation by gardeners while working on the plots, at assigned, specified times. It is specially important that such supervision be present during periods when most of the planting is done, and also when insect pests may require control measures.

Bulletin boards should be set up, for posting announcements, rules, timely information, plot numbers and assignments, and other notices.

PROTECTION MAY BE NEEDED

Frequently it is necessary to provide protection, in addition to the usual police service, against theft and vandalism. Volunteer guards serving for brief scheduled periods may solve this problem in many cases. The posting of names of families conspicuously on their respective plots often will serve as a sufficient restraint from trespass by patrons upon each others' gardens.

Usually it is desirable to draw up a set of simple rules about the maintenance of the gardens, including weed control, disposal of rubbish, insect control, and the like.

AN EDUCATIONAL PROGRAM IS HELPFUL

Courses of lectures on gardening by qualified persons are a means of stimulating interest in community gardening and of improving the chances for success of the patrons. In Lancaster, Pennsylvania, the Victory Garden Committee has required that prospective patrons attend such a course of study, presented during the early spring before outdoor activities begin, before they become eligible to be assigned community garden plots. Occasional demonstrations of proper tillage, disease and insect control, watering, and harvesting methods at proper times during the growing season are very valuable to patrons.

SUGGESTIONS TO INDUSTRIAL FIRMS ON VICTORY GARDENS FOR EMPLOYEES

PROMOTION

Sufficient evidence is at hand to show that vegetable growing for home use is not merely a patriotic activity but most likely will be a very necessity if adequate nutrition of the population, and particularly of the workers in industries necessary to the prosecution of the war, is to be attained. For this reason, it is not sufficient only to assist those employees to produce vegetables who wish to do so; employers should urge and encourage all in their employ to grow as many vegetables, fruits, and other foods as the prevailing conditions permit.

ORGANIZATION

A manager of Victory Gardens should be placed in charge of the project as part or all of his duties to the firm, depending upon the extent of the company project. He should be primarily a manager, but should be reasonably well informed on gardening, even if competent gardeners are employed to take immediate charge of gardening operations.

Committees of employees may attend to details.

PROCEDURE

1. Promote Victory Gardens among employees by means of lectures, courses of instruction in gardening methods, posters, and other devices, including prizes for most successful gardens.

2. Find the number of employees who need land, and make a survey of suitable land which is readily accessible either to the factory or to the homes of employees. An effort should be made to provide at least 1000 square feet of land for each member of the employee's family, or a plot 50 by 100 feet for a family of five.

If land is rented, a lease or other written agreement should be drawn.

3. Employees desiring plots should be required to make application on prepared forms, and, when plots are assigned, should sign an agreement to care for the garden and to utilize and store all of the products, or to share surpluses with others. An accurate record should be kept of plot assignments.

4. In larger tracts, allocate garden plots of standard sizes, say 50 by 50 feet, so that a regular arrangement of plots can be laid out. An employee with a family of two or three would be assigned one plot, one with four or five, two adjacent plots, and so on. Adequate paths between blocks of plots should be provided. Plots should be marked with stakes, with a permanent marker showing the number of the plot and the name of the gardener.

5. Plowing and harrowing, manuring, liming, general fertilizing, and staking of plots in large tracts should be done preferably by the management, though special fertilization may be left to individual gardeners. Costs of these operations and of land rent may or may not be pro-rated to the individual gardeners, though, as a rule, at least a nominal charge should be made for the plots.

6. Seeds, plants, supplies and tools can be purchased more advantageously by the management and charged to gardeners. A saving may be effectuated if tools are purchased collectively and rented or loaned to individual users for a cash deposit. If tools are not provided by the firm, employees should be encouraged to purchase tools in partnership groups, and locker space for tools should be made available near the plant or the gardens.

7. Suggested plans for planting garden plots of the common sizes assigned should be prepared and should be either distributed or posted conveniently. Several plans for each size should be provided to allow some room for choice.

8. Information in mimeographed or printed form on all the different gardening operations should be made readily available; when operations are actually in progress, a competent supervisor should be on hand to instruct inexperienced gardeners and to answer questions.

SUPERVISION OF GARDENING OPERATIONS

Wherever the size of the company garden project warrants it, a supervisor should be present during all times when gardeners are working on the plots. General care should be checked frequently, including planting at proper times, cultivating, weeding, thinning, harvesting, and particularly the control of diseases and insects.

Every effort should be exerted to prevent pilfering. It may be necessary to arrange a guard, especially when no employees are present. Committees of the gardeners may attend to this.

A cover crop, such as rye grass, should be planted in the early fall, between rows of crops which will remain for the rest of the season, except where short-season fall crops are grown. The firm preferably should supply the seed of cover crops, though individual gardeners might plant it. All land which may be available for gardening in 1945 should be seeded with the proper cover crop when the 1944 season has ended.

Cucumbers from a Company Victory Garden Plot

—Photograph by B. P. Hess, Westinghouse Electric and Manufacturing Company, Pittsburgh, Pennsylvania

CONSERVATION OF CROPS

Home conservation of crops which are surplus above immediate needs should be urged, either by canning, drying, freezing, or storing. If home facilities for canning are lacking, an effort should be made to provide them on a company or co-operative basis. If pressure canners or frozen lockers cannot be obtained for non-acid vegetables, drying equipment should be given consideration. When a company canning center is set up, competent supervision should be arranged.

Properly protected land should be made available for outdoor pit storage of root crops and other vegetables which are adapted to this type of storage.

A summary should be compiled of the results of the project at the end of the season, including estimates of the different crops and statistics on the amounts stored or conserved for winter use.

VICTORY GARDEN COMMITTEES

The assistance of local Victory Garden Committees, organized under the State and local Councils of Defense, should be sought in all phases of the organization and operation of the project. If a company Victory Garden Committee is organized, it should be encouraged to associate itself with the State Victory Garden Program, directed in Pennsylvania by the State Council of Defense through the Advisory Victory Garden Committee, of which Mrs. H. B. Eliason, State Council of Defense, Capitol, Harrisburg, is Chairman.

The recommended procedure is for the company Victory Garden Committee to be constituted a sub-committee of the Local Victory Garden Committee, if such has been organized, or as a Local Victory Garden Committee under the County Committee if other local committees have not been set up. By this plan the company project will become a part of the State program, and announcements, bulletins, and instructions will be received regularly as issued from the State Council of Defense.

ACKNOWLEDGMENT

Many of the foregoing recommendations have been adapted to Pennsylvania conditions from suggestions by L. A. Hawkins in "A Master Plan for Company Victory Gardens," published by the National Victory Garden Institute, 598 Fifth Avenue, New York City, New York.

VVVVVVVVVV

WESTINGHOUSE VICTORY GARDENS

The company gardens at the Westinghouse Electric and Manufacturing Company are illustrative of what can be done when an industrial concern makes land and educational assistance for Victory Gardeners available to employees. In this instance, B. P. Hess, a Westinghouse employee, was made supervisor of Westinghouse Educational Center Victory Gardens. Mr. Hess obtained his knowledge of gardening both from training and experience. Raised on a farm, he has obtained academic degrees both in agriculture and electrical engineering from Ohio State University.

For its outstanding contribution to the Victory Garden program in 1943, the Educational Center of Westinghouse was awarded an honorary plaque by the National Victory Garden Institute.

The Westinghouse Educational Center sponsored 192 Victory Garden plots covering 13 acres for employees of the East Pittsburgh Works. The plots were at two locations east of Pittsburgh, on Ardmore Boulevard and on the Greensburg Pike.

A planned program of mailed suggestions for the planting, cultivation, harvesting and preservation of crops was conducted by B. P. Hess, supervisor of the project. The season's activity was capped by a display of canned and dried foods raised by the war worker growers. Top prize for a special variety display was awarded to John W. Yex, of 7321 Kelly Street, Pittsburgh. He was one of 25 exhibitors, who made entries in 34 prize winning classes.

Plans have already been started for an expanded Victory Garden activity for Westinghouse workers in 1944. "Our gardeners cultivated 27,472 feet of corn, 68,100 feet of beans, and 10,200 tomato plants, in addition to growing many other crops this year," said W. V. Foust, chairman of the Center's gardening committee. He added:

"Next year we'll do even better. The war demands for food are increasing and vegetables offered for sale will probably be a lot scarcer next summer. Accordingly, a goal of at least 300 garden plots has been set."

Judges for the award of the National Victory Garden Institute plaque were Richardson Wright, editor of House & Garden magazine; J. W. Johnston, horticultural editor of the New York Herald-Tribune; and Carl F. Wedell, head of the School of Horticulture, State Institute of Agriculture, Farmingdale, New York.

The Institute is part of the Garden Clubs of America.

VVVVVVVVVV

—Photograph by B. P. Hess, Westinghouse Electric and Manufacturing Company, Pittsburgh, Pennsylvania

A Corner of the Westinghouse Gardens, Pittsburgh, Plowed and Ready for the Season. A Driveway Was Left Around the Fields to Simplify Plowing and to Make Each Plot Accessible.

SCHOOL GARDENS

In no way can nutrition be taught better to children in the elementary grades, and in the high schools, than by making it possible for them to produce food for the school lunch. The planning of a school garden on the basis of the nutritional needs of the children who will eat the garden's produce gives an extraordinarily splendid opportunity for teaching practical nutrition.

A bulletin entitled **Nutrition Education in the Elementary School,** published by the Federal Security Agency, United States Office of Education, United States Department of Agriculture, Food Distribution Administration, lists the following types of nutrition education as particularly valuable for children in the elementary grades.

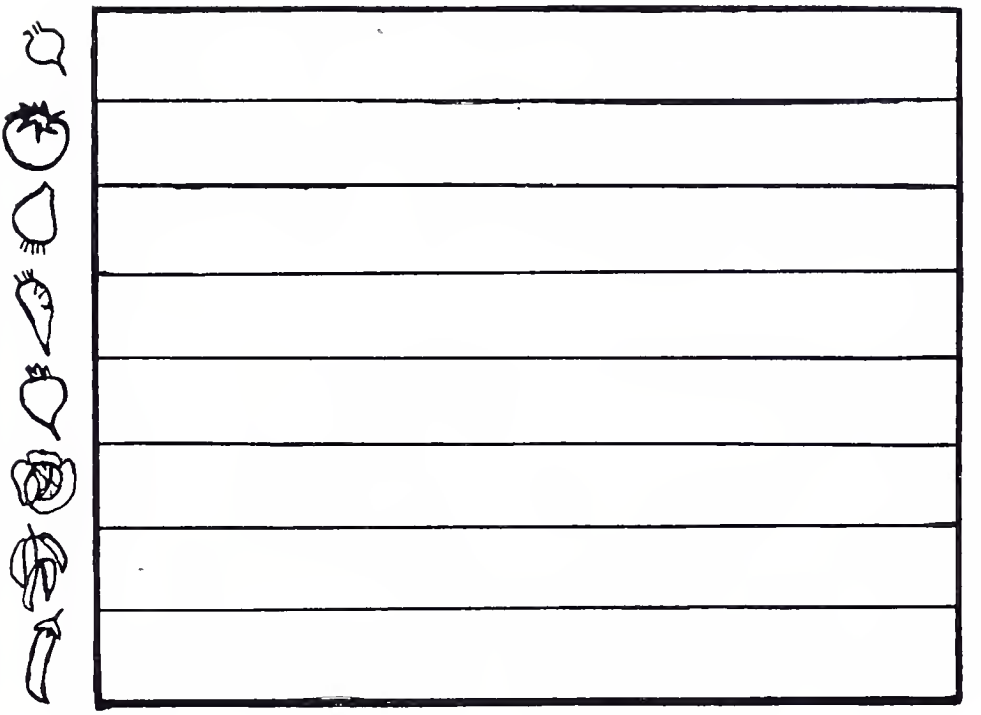
Keeping One's Growth Record
Learning the Signs of Good Nutrition
Checking One's Food Intake Against a Daily Food Guide
Conducting an Animal-Feeding Experiment
Feeding Pets and Farm Animals
Experimenting to Learn the Composition of Foods
Meal Planning
Preparing Foods
Buying Foods
Selling Foods
Producing Foods
Participating in the School Lunch
Working with Parents in Nutrition Education

A quotation from this publication shows the advantages of school gardening:

"Production of food is another type of experience which lends itself to nutrition education in the elementary grades. It usually takes the form of planning and caring for a school garden. The immediate object of having the garden may be to grow food for the school lunch. Another object generally is to interest pupils in the possibilities of growing part of the family's food supply and in assisting in caring for a home garden. Besides the actual care and cultivation of the plants, the garden may motivate a study of the comparative food values of different vegetables and fruits and afford opportunity to learn of the desirability of using most garden products immediately after they are harvested, of ways of storing and preserving garden products, and of the value of year-round gardening in localities where that is possible. School gardening may also help develop a favorable attitude toward the eating of vegetables.

"Occasionally it is possible for an elementary school to provide pupils with an opportunity to take part in caring for laying hens, rabbits, pigeons, a milk goat, or a cow. Such experiences could be expected, under favorable conditions, to result in increased interest in

JAMES SMITH
HIS VICTORY GARDEN
GRADE SIX
FRANKLIN SCHOOL
1943



Scale ½"=1'

Study Sheet for Grade School Child to Keep Growth and Other Records on His Victory Garden. This chart, together with the procedure for its use on the following page, was formulated by Rachel P. Hartman, Principal, Fifth Street School, Bloomsburg, Pennsylvania.

eating the products. Also, they may lead the families of pupils to produce more of their own food supply. A special effort to provide experiences in producing food at school is needed during wartime, because it is important to use every channel for stimulating home-grown food production."

The following outline gives a suggested school Victory Garden project, particularly designed for the fifth, sixth, seventh, eighth, and ninth grades. A similar project could well be designed for the three upper high school grades.

In the diagram on page 65, the child is requested to indicate the amount of each of the major vegetables which he has planted.

SUGGESTED SCHOOL VICTORY GARDEN PROJECT

For Grades 5, 6, 7, 8, 9

Procedure: The county superintendent, the supervising principal, the principal, and the grade teacher, with the help of the art department and the local Victory Garden chairman would work out this project. The project would be a garden plot covering an area 8 by 10 feet, suitable for younger children, but conceivably could be increased in cases where children are able to care for larger areas.

Presuming that the first crop is radishes, on his garden plan the child will draw two parallel lines in brown crayon, representing the opening of the furrow and the planting of the seed, and note the date on the margin of his chart. When the plants appear the child will draw a line of green dots between the two brown lines, again noting the date. When the first of his crop is harvested, he will make a red X beside the row, giving the date. The plan is the same throughout.

In miniature, this project gives a horticultural gamut dealing with leaf crops, root crops, and fruiting crops, and the technique of raising from seed, from sets, and from transplants, the latter being provided by starting the tomatoes from seed in the class room.

The school could turn to the local Victory Garden chairman and the vocational agriculture teacher for all information as to correct planting dates for the region, soil tests, etc., and ask for inclusion in the Victory Garden community plot for such children as have no available land for this gardening. At the proper time the authorized State Victory Garden Certificate would be issued by the Victory Garden chairman to all school children enrolled in the movement.

This project would be highly personalized for the child and should hold his interest. It would give him exercise in exactness in his work on the chart and manual dexterity in working with the soil. It would also instigate a competitive spirit in the child. Likewise, a very practical lesson in arithmetic is included in keeping an accurate account of the profits received from his vegetables above the amount expended. This project also correlates with nature study, science, and nutrition.

The charts could be mimeographed, with the help of the art department in drawing the vegetables at the margin of the plot. The children themselves would color the vegetables. Suggested vegetables from the top to the bottom of the chart are radish, tomato (4 plants to the row, staked, and set from started plants), onions (planted from sets), carrots, beets, lettuce, soy beans (variety Bansei is suggested—Soy beans are practically immune to Mexican Bean Beetle), and peas (extra early and dwarf varieties such as Little Marvel and American Wonder are suggested, to mature and be harvested, allowing space for development). This plot presumably needs no spraying.

If desired, the school could request that the local Victory Garden chairman or members of his committee visit the gardens during the summer.

Perhaps, in the fall, when the charts are all returned to the school, a complete master plan of the school children's contribution to Victory Gardens could be put on display, showing the entire output.

VICTORY GARDEN IN A SCHOOL FOR CRIPPLED CHILDREN

One of the finest Victory Gardens for 1943 seen anywhere was that planned, planted, and cultivated by children in the **Watson Home for Crippled Children** in Sunny Hill, Leetsdale, Pennsylvania, a suburb of Pittsburgh. The next article tells the story.

This Child Enjoys Her Victory Garden Work.

GARDENING WITH CRIPPLED CHILDREN

By Evelyn Hanlon, R.N.

I want to tell you about the gardens we have had the last three years at the D.T. Watson home for Crippled Children, where I work as a nurse. In 1941 we thought it about time the children had a garden of their own, where they could dig to their hearts' content and pick their own flowers and vegetables. We selected a plot away from the house on a strip near the greenhouse. Small tools were bought and we began to dig—at first with good will.

Those of you who do not know the crippled child will find it hard to understand just how we managed at all, but I tried to give them things to do that would help their weak muscles and not tire them too much. The worst ones are those who wear leg braces that come high on the thighs. They just cannot stoop. They had to sit in the path and reach from there.

In this garden we bordered the whole plot with strawberries, which yielded just a few that year. We grew popcorn and had a wonderful popcorn celebration on Hallowe'en. The children could hardly believe it was their own corn which was popped.

Many times that year of our first garden I wondered if it was worth while. Interest lagged and the weeds tried to get ahead of us, and some of the children began to realize that it was more work than play and that they could not keep dressed up all the time and still work in the garden. I began to think that we had kept our girls too sheltered or something. Anyway I decided to move the garden up near the building the next year and see how that would work. In the meantime the strawberries kept on growing and now have taken up the entire plot and at last we have a strawberry garden.

Now about our real Victory Garden which we had last summer and which I think was a success for the children, but I am afraid we can hardly say that it was economical from a food standpoint.

We had to have a plot near the building where I could run out when I had a moment to spare from my nursing duties and where we could watch the younger children and keep them interested.

The only land near the building is our wide and sloping lawn, but I did find a fairly flat spot on the east side of the building around from the back door and accessible from the library. Just the place, but Oh! that beautiful lawn—it seemed a shame to dig it up. But after conferences with the supervisor we decided it would be the ideal spot. So plans were drawn up with the help of the children, and seeds ordered and started indoors.

Some of the little boys in bed were so homesick for the farm, and this was a good outlet for them. They were able to do the indoor work and took great pride with their seeds and plans.

We were fortunate to secure the help of an old man who lives on the place and he built us a tool box and cold frame, where our seeds were shifted when the weather permitted. Of course, we had many set-backs with the seeds, but we tried to do everything scientifically. I used the dressing sterilizer, or autoclave, as it is called, to sterilize the soil before starting the seed and I allowed the children to take turns planting and caring for them. Then when ready, they learned how to prick them off into flats, and from there to our cold frame. By this time the housemaids and other people of the buildings were very glad that we were moving outside.

We planned the garden so that wheel chairs could pass between the rows. So we just left the strips of lawn where they were, to act as paths, and dug the beds out between the paths. Of course we had to have a "V" for Victory, so that was dug out also and planted with dwarf marigolds, which bloomed beautifully all season. Petunias were planted at the bottom of the garden and zinnias on the ends, and more marigolds at the top, and some everlastings. In the vegetable line we had small fruit tomatoes, carrots, radishes, onions, lettuce, and turnips—everything that could be eaten without cooking.

Every week-end we had a wiener or marshmallow roast near the garden. The children enjoyed the get-together and picked things out of the garden to nibble on.

This year I would like to incorporate a fireplace in our garden and make it out of field stone instead of tin. Also, a summer house has been discussed, so it looks as if we will have many more happy hours in the garden.

Crippled Children Perform Whatever Tasks They Can in Their Victory Garden.

TECHNICAL INFORMATION FOR THE VICTORY GARDENER

TECHNICAL INFORMATION IN GENERAL

All citizens who are interested in producing food for home use, whether as individual families, in community gardens, or as part of industrial garden projects are urged to take advantage of general technical information as well as timely, particular reminders and recommendations, which are available either through county, local, or company Victory Garden Committees, or directly from the County Agent or Agricultural Extension Representative, the County Home Economics Extension Representative, or the Agricultural Extension Service at the state college or university.

Precise information is available at all times from these sources, on best adapted varieties, sources of vegetable seeds or plants, plant growing methods, choice of site and soil when such is possible, soil preparation for planting, liming, manuring, fertilization, irrigation, seed sowing, transplanting, planting dates, probable yields of different kinds, season of maturity, planting plans, rotations, tillage methods, special cultural methods for each vegetable, insect and disease identification and control, proper maturity for harvesting, harvesting methods, storage, freezing, canning and drying methods, recipes for preparing, and nutritive value of the different kinds of vegetables. In addition, special bulletins and news letters are issued by the agencies named from time to time or when occasion demands, on such timely subjects as protection against insect pests or diseases which threaten to be specially destructive.

To be sure of obtaining such timely information, the Victory gardener should consult his local Victory Garden Committee, should visit the garden center if one has been set up conveniently, or should request his committee to establish it if none is accessible, and should register his name and address with his Victory Garden Committee. Reference will be made later to Victory Garden registration, but for the present it should be emphasized that such enrollment implies no obligation on the part of the Victory gardener but simply enables his Victory Garden Committee to make its services more readily available to him, besides providing a census of war home gardening.

CHOOSING VARIETIES AND OBTAINING SEEDS AND PLANTS

The choice of varieties is dictated to some extent by personal preferences, but to a considerably greater degree by the adaptation of the different varieties to local conditions. For this reason, information from local, reliable sources in many instances is preferable to that from more distant agencies. In a few kinds, certain varieties of high edible quality though of greater perishability may be preferred for home culture, above the more durable varieties required for distri-

bution through commercial channels. There is known to be some variation in vitamin content among different varieties, but as yet the information on this point is not sufficient to provide a basis for choice in any kind except possibly the tomato, of which the well-known earlier varieties are lower in vitamin C than the main-crop ones.

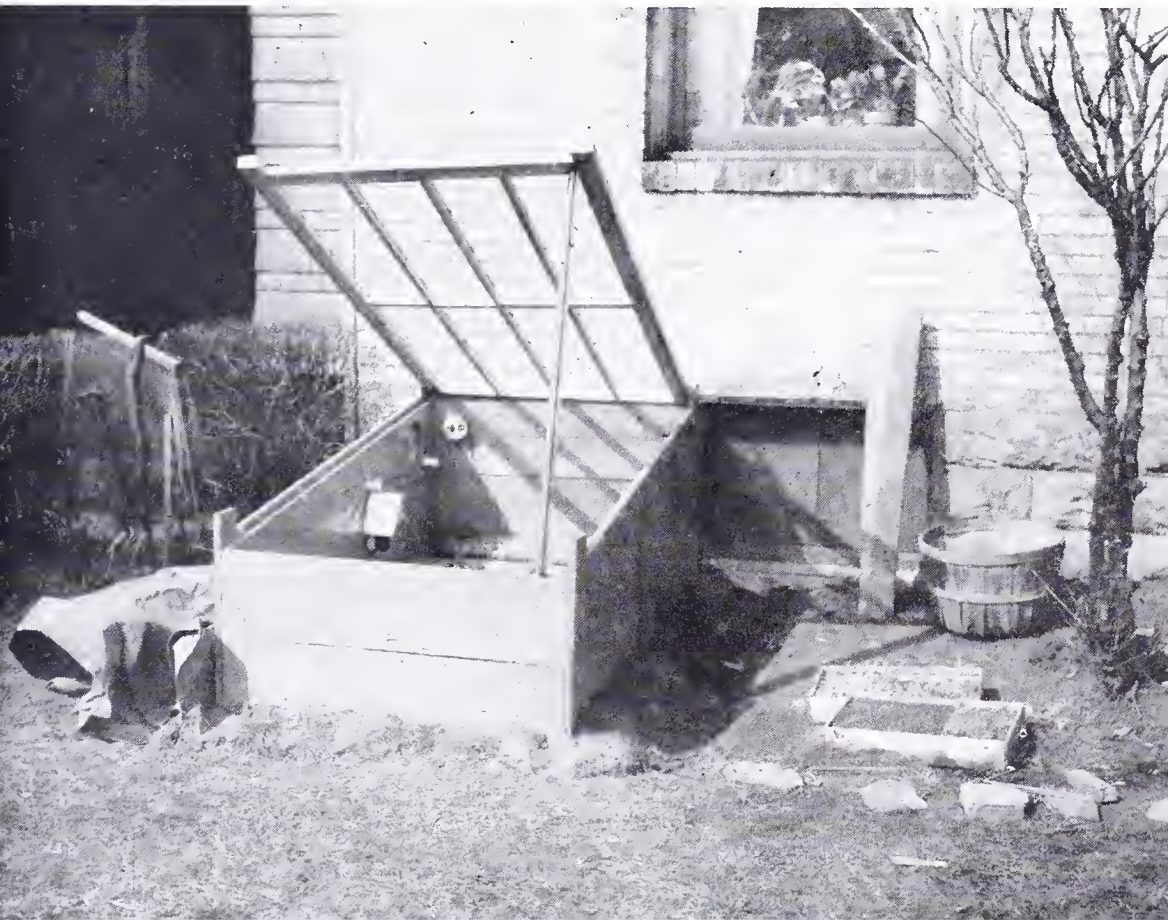
The Agricultural Extension Service of The Pennsylvania State College annually issues a list of recommended varieties, which have been found to be widely adapted and also satisfactory in yield and edible quality. Copies of the list may be secured from the office of the County Agent, who may be able to assist the home gardener in making his choices among those varieties which are well adapted locally. The following brief list names generally adapted varieties of the kinds shown in plans presented in an earlier part of this publication.

PREFERRED VARIETIES FOR PENNSYLVANIA

Onion, Ebenezer for full grown, Silverskin for spring onions; leaf lettuce, Grand Rapids; bush string beans, Tendergreen; beets, Detroit Dark Red; carrots, Red Core Chantenay; kale, Dwarf Curled Scotch;

An Electrically Heated Hotbed May be Used in Which to Give the Young Plants a Start. This One is 3 x 6 Feet, Containing 12 Flats, Each 12 x 18 Inches. A Standard Hotbed Sash is Used.

—Photograph by B. P. Hess



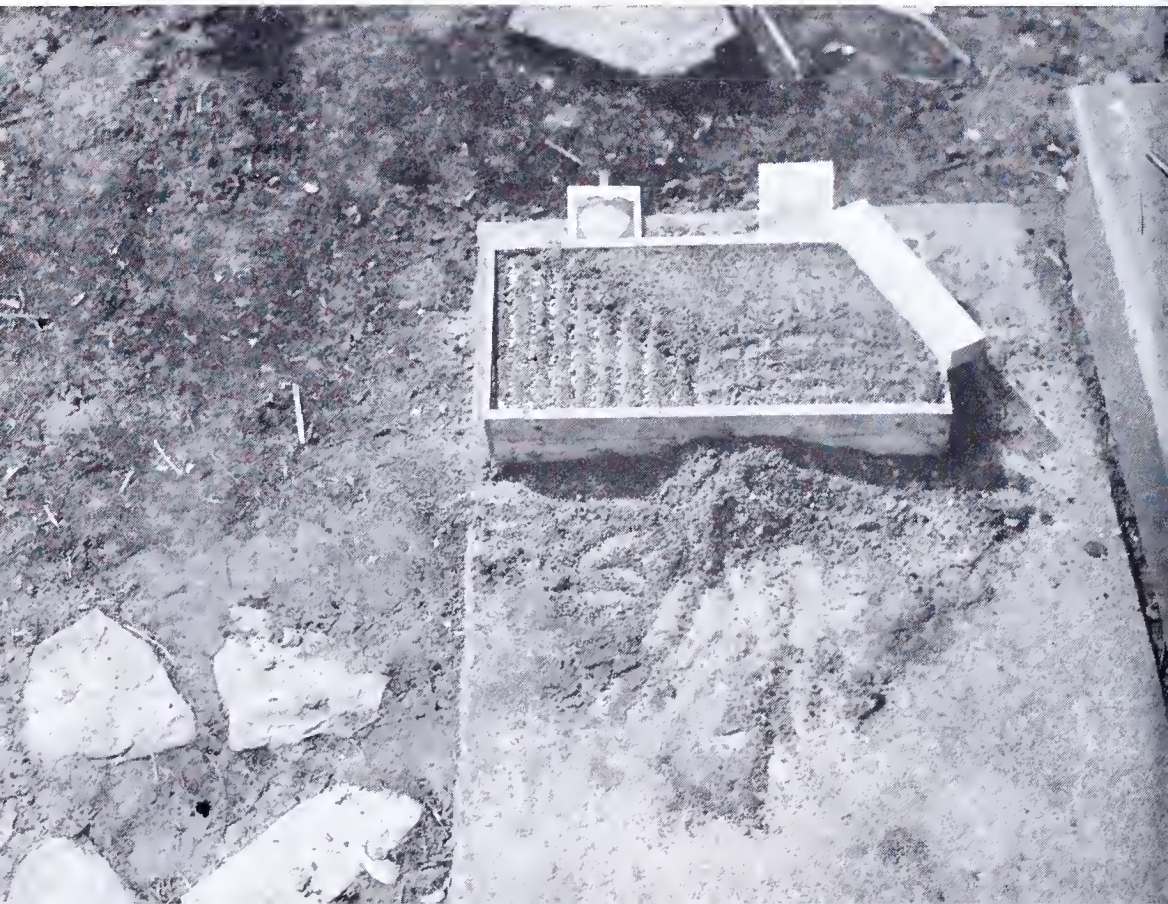
Chinese cabbage, Chihli; cabbage, Golden Acre; head lettuce, White Boston; yellow turnip, Golden Ball; Swiss chard, Fordhook Giant; pepper, California Wonder; tomato, Rutgers or Stokesdale; radish, Early Scarlet Globe or White Icicle; mustard greens, Fordhook; dwarf pea, Little Marvel; edible soy bean, Bansei; endive, Green Curled or Broad Leaved Batavian (escarole); turnip greens, Seven Top or Shogoin; late cabbage, Penn State Ballhead; sweet corn, early, Spancross or Marcross; sweet corn, midseason, Golden Cross Bantam or Ioana; broccoli, Green Sprouting or Calabrese; cucumber, Clark Special for slicing, National Pickling for pickles; bush lima bean, Fordhook.

HOW AND WHERE MAY VEGETABLE SEEDS AND PLANTS BE OBTAINED?

Vegetable seeds should be purchased preferably from established seed dealers. The seed packets displayed on racks in grocery and hardware stores or gasoline filling stations may vary considerably in quality; some, packed by reputable seed firms, may be fully satisfactory; others may be low in germination and in other qualities, and the price for the quantity obtained may be high. Gardeners may buy co-operatively, by estimating the actual quantity of seed needed, and sending orders together to established seed firms or co-operatives.

Seeds Are Put in Rows in Flats, Each Flat is 12 x 18 Inches.

—Photograph by B. P. Hess



Farmers and experienced gardeners with sufficient space who will have large gardens may be justified in constructing hotbeds and coldframes to produce their own plants. Such gardeners may obtain information on recommended methods from the County Agricultural Extension Representative or from The Pennsylvania State College School of Agriculture (Leaflet 38, Growing Early Vegetable Plants Under Glass).

Plants may be grown in window boxes, but the atmospheric conditions and the temperature in living rooms usually are not satisfactory for vegetable plants. Plants produced by commercial plant growers, and distributed by garden supply stores, florists, or commercial plant farms are more likely to be satisfactory than are those produced at home by inexperienced gardeners without special facilities for producing plants.

EARLY PLANTS MAY BE GROWN IN HOTBEDS

Though it is recommended that home gardeners obtain their early plants from experienced plant growers, many with a suitable location may find it interesting to grow their own. For this purpose, a hotbed is the simplest structure in which plants may be protected against the cold. This consists of a well insulated frame supporting one or more glass sashes, sloped toward the south. Heat may be from fermenting manure, a coil of hot water pipe, or from special electric heating cable.

GENERAL DIRECTIONS FOR THE CULTURE OF THE HOME GARDEN

WHAT IS A GOOD LOCATION FOR A GARDEN?

A garden site should be reasonably level and should be exposed to direct sunlight for at least six hours a day; spots shaded by large buildings or trees should be avoided. The darker topsoil should be eight inches deep or more, and drainage should be such that no water stands on the surface longer than a few hours, even after heavy rains.

Soils which have produced good vegetable or farm crops previously or a heavy growth of weeds if idle should be chosen if possible. Filled-in plots may not be satisfactory, particularly if cinders, rock, or rubbish are included in the fill. If weed growth has been heavy, however, such plots may be used. Stony land is laborious to dig and cultivate but may be used if larger stones can be removed.

IS A SOIL TEST NECESSARY?

Little information is obtained from a soil test, except for lime requirements, unless the test is made and interpreted by an expert. In view of the great number of gardens which may be expected in 1944,

it is evident that public agencies will not be able to make soil tests on any considerable proportion of them. The information given by the vigor of plant growth in previous seasons should be sufficiently reliable under present conditions.

SHOULD LIME BE USED?

Most Pennsylvania soils which are suitable in other respects for gardening probably will not require liming. The advice of the County Agricultural Extension Representative should be sought through the local Victory Garden Committee; he is able to test representative samples of soil for lime requirement, if he suspects that lime may be needed generally in a given locality.

If lime is needed, it is the least expensive fertilizer that can be used for the gains which may be obtained. The preferred form to use is ground limestone which may be obtained from most dealers in garden supplies; hydrated lime also may be used. Ground limestone may be applied where needed at the rate of four or five pounds to 100 square feet (10 by 10 feet); three-fourths as much hydrated lime will be sufficient. Spread the lime evenly over the surface before spading, and mix it deeply and thoroughly with the soil.

WHAT FERTILIZER WILL GIVE BEST RESULTS?

If well-rotted stable manure can be obtained in sufficient quantities, it is the best garden fertilizer. It should be spread over the surface before digging or plowing, and should be spaded or plowed into the soil, though not all at the bottom of the trench or furrow. Fresh manure may be used only if several weeks can be allowed after spading before seeds or plants are planted.

Most Victory gardeners will be obliged to rely upon chemical fertilizers to a greater or lesser extent. The Victory Garden Special fertilizer, with analysis or grade of 5-10-5 (5 per cent. nitrogen, 10 per cent. available phosphoric acid, and 5 per cent. water-soluble potash) is the only fertilizer which is permitted by governmental regulations to be packaged especially for home gardens. Apply this at the rate of two to three pounds to each 100 square feet.

Superphosphate may be all that is needed on fertile gardens which have been well manured, or on which a good growth of weeds, compost, or other organic matter has been spaded in. Apply at the same rate as the Victory Garden Special fertilizer. If chicken manure is used, superphosphate alone, or a mixture of phosphate and potash (0-14-7 analysis) may be added, to make the chicken manure go farther.

Dried manures may be used, though they are often somewhat expensive in comparison with chemical fertilizers containing equivalent amounts of plant nutrients. Follow directions on the bags.

CAN FERTILIZER BE APPLIED NEAR THE SEEDS OR PLANTS?

A part of the Victory Garden fertilizer may be applied near the row in which the seeds or plants are to be planted, for quick effect. Open a drill or trench two or three inches deep and two inches away from the line where the row of plants is to be located. Distribute the fertilizer along the bottom of this trench at the rate of a pound to 50 feet of row. Cover the fertilizer, and plant seeds and plants in the row, two inches away from the fertilizer.

Fertilizer may be applied also in water by mixing a teacupful in a 12-quart sprinkling can full of water, and pouring a teacupful of the mixture on the roots of plants as they are being set in the transplanting holes, covering the roots with soil immediately without packing. The mixture may be applied to seeds as they are sown at the rate of a teacupful to each foot of row just before the seeds are covered with soil.

IS ORGANIC MATTER NEEDED AND HOW IS IT SUPPLIED?

The effectiveness of fertilizer is increased greatly by the presence of organic matter in the soil. The chief sources available to Victory gardeners are composts of leaves, straw, grass clippings, or vegetable plant refuse which does not harbor diseases. Manures are the most valuable source, if available. Leaf mold, ground peat moss, the commercial humus are effective but may be relatively expensive. Crop residues and green manures, or plants such as rye or domestic rye grass, grown for the purpose of plowing or spading into the soil are cheap, very valuable sources of organic matter.

WHEN AND HOW SHOULD SOIL BE PREPARED FOR PLANTING?

Soil should be prepared for planting by spading or plowing deeply (8 to 10 inches) turning under any manures, green manures, lime or fertilizer, and raking or harrowing to firm and level the soil and to break up clods. This should be done as early in the spring as the soil is dry enough, which can be judged by packing a handful, then crumbling it. If the soil packs enough to hold its shape, but crumbles readily without smearing at all, it is in excellent condition to prepare for planting.

HOW IS A GARDEN PLANNED?

Garden plans should be drawn on paper, indicating the location of each kind of vegetable, arranged so that planting can be done row by row at the proper time for each kind. Vegetables should be planted in rows extending through the garden, for convenience in all tillage operations.

The kinds of vegetables and the amount of each are determined by the class of soil, the size of the garden, family preferences, yield of food in proportion to the space required, and above all, at this time, by

the nutritional needs of the family. A table of the nutrient content of vegetables which may be grown successfully on most soil types in Pennsylvania is included in this publication, (pages 30-32) and sample plans also are presented.

These are to be considered as simply illustrations of the method of planting a garden, rather than recommended plans for all Victory gardeners. Other suggested plans for gardens from 11 by 15 feet up to those in which the entire vegetable supply can be grown for a family of any number and age of members may be obtained from your local Victory Garden Committee.

WHEN IS THE PROPER TIME TO PLANT VEGETABLES?

The proper time to plant the different kinds of vegetables depends upon their relative hardiness or tenderness, or susceptibility to damage by frost, and upon their climatic preferences. Relatively hardy vegetables may be planted as soon as the soil can be prepared in spring, or as early as the first of April in the warmer portions of Pennsylvania, or about April 15 in the central part of this State. Among these are onions, peas, early potatoes, spinach, parsley, turnips, lettuce and cabbage plants, beets, carrots, Swiss chard, mustard, parsnips, and radishes.

Beans, sweet corn, New Zealand spinach, squash, and pumpkin may be seeded slightly before all danger of frost is past, but not so much earlier that seedlings are above ground before the last frost is likely to occur. In central Pennsylvania this is about May 10.

Tomato, pepper, sweet potato, and eggplant plants should not be set out until danger of frost is past, or about May 15 in most of Pennsylvania.

Spring planting dates vary considerably in Pennsylvania, mainly because of differences in elevation and distance from large bodies of water. Extremes vary from nearly two weeks earlier to two weeks later than the dates shown in the garden plan elsewhere in this publication. Similarly, fall planting dates, which vary because of the date of the first killing frost in the fall, must be earlier if frost is early, as at high elevations in the north central part of the State, or later in the southeastern portion.

IS WATERING OR IRRIGATION PRACTICABLE?

Light sprinkling, as is done frequently by means of a hose, is at best a waste of water and may cause a hard crust to form on the surface of the ground. If watering is done, enough should be applied to soak the soil to a depth of eight inches, or to be equivalent to a good rain.

In towns or suburban areas in which water supplies already are drawn upon heavily by war industries, first consideration should be given to maintaining the organic content of the soil, the use of surface

mulches, and other methods of conserving moisture in the soil. Where supplies are adequate, or streams and springs can be drawn upon, proper watering produces favorable results, especially on leafy vegetables with shallow root systems, such as celery, spinach, and cabbage, or on root crops.

HOW OFTEN IS IT NECESSARY TO CULTIVATE OR HOE THE GARDEN?

The chief value of hoeing or cultivation is to prevent weed growth, and for this reason it is necessary to cultivate or hoe often enough to keep weeds from making a start, but no more often. Digging the soil in itself does not favor the growth of vegetables, but if done too deeply (more than an inch) may cause some damage through injury to roots of the growing crop.

The best time to hoe is long enough after a good rain or irrigation to allow the soil to become fit to work, but before weeds have gained a start. Scrape the soil, breaking up the surface crust and destroying germinating weeds, but not disturbing the soil at a greater depth than one or one and one-half inches.

ARE SUMMER MULCHES BENEFICIAL?

Summer mulches, in the form of straw, grass clippings, or weeds which have not developed seeds, help to conserve moisture, prevent soil erosion and the escape of rain water, and, if applied thickly enough, stop weed growth. After they have served their purpose, they may be worked into the soil as organic matter.

WHEN IS THE PROPER TIME TO HARVEST?

Many vegetables remain in best eating quality during short periods only, particularly those used during the young stages of development of the edible portion, such as peas, sweet corn, snap (string) beans, cucumbers, and asparagus. Such vegetables should be harvested before they have become over-mature, because their palatability, cooking quality, and in some cases nutrient values and digestibility are highest during the best stages for eating. If they are harvested when too young, on the other hand, the quantity of food obtained will be less, and some sacrifice of eating quality may be made.

Vegetables which are eaten when mature, such as tomatoes or melons, should be allowed to ripen fully on the vine or plant. Root crops may be harvested during a more or less prolonged period, beginning as soon as they are large enough, and continuing until they begin to become corky or woody. Carrots and beets, for example, may be harvested as needed, from the time when they are large enough and throughout the rest of the season. Carrots increase in carotene content (pro-vitamin A) as they become older, and do not become tough or woody unless they are split or damaged.

HOW MAY SURPLUS CROPS BE CARED FOR?

Surpluses of perishable vegetables may be shared with neighbors who have insufficient supplies, or certain of them may be canned, dried, pickled, frozen, or salted. Root crops, cabbage, squashes, potatoes, and the like, which mature late in the season, may be stored.

For details of canning, drying, freezing, salting, or other methods of preserving vegetables and fruits, secure a copy of "Conserving Victory Garden Products" from your local Victory Garden Committee, or a copy of The Pennsylvania State College Agricultural Extension Leaflet on the respective method of preservation.

For details of storage, secure from the Agricultural Extension Service a copy of Leaflet No. 84, Storing Vegetables. This and other Extension publications may be obtained from the office of the County Agricultural Extension Representative in the county seat, or from The Pennsylvania State College School of Agriculture, State College, Pennsylvania.

SHOULD PERENNIAL VEGETABLES AND SMALL FRUITS BE INCLUDED IN VICTORY GARDENS?

In very small gardens, space usually does not permit the growing of perennial crops, such as asparagus, rhubarb, and berries which require from one to three years before harvesting begins. In larger areas space along one side of the garden may be devoted to these vegetables and fruits. The farm home garden should contain asparagus, strawberries, raspberries, blackberries, grapes, and other small fruits. Rhubarb presents difficulties in view of restrictions on sugar. Even on small town lots, a few of these kinds such as asparagus and currants, may be grown as ornamentals in sunny spots along borders.

Refer any Special Questions or Difficulties to Your Victory Garden Committee; if Further Help is Needed, Ask the Assistance of the County Agricultural Representative (County Agent), County Home Economics Extension Representative, or The Pennsylvania State College School of Agriculture, State College, Pennsylvania.

HOW CAN PESTS BE CONTROLLED?

Pests may be considered as groups, among which are insects, rodents, and diseases. Foremost among control methods are good garden care and neatness about the premises, including the elimination of rubbish, weed and brush patches, and other places where pests may be harbored. Next in order may be placed those practices which favor rapid, vigorous growth of vegetables, such as timely planting and cultivation, fertilization, and choice of vigorous varieties.

Rotation of crops, or planting vegetables of different kinds, and, as far as possible, of different plant families, in succession, is another valuable part of pest control.

Certain insects, however, may be troublesome regardless of measures such as those just named. Hand-picking of adult insects such as potato beetles, bean and asparagus beetles, squash bugs, and the like, and crushing of egg masses found on the under side of leaves are practicable methods in small gardens.

Other insect pests require the application, in sprays or dusts, of the proper insecticides. Instructions on choice of materials and time of application may be obtained from the County Agent or through Victory Garden Committees.

In small gardens, practical disease control consists mainly in planting of disease-free seeds and plants to be obtained from reliable dealers, in control of weeds and insects, in timely planting and cultivation, and in proper drainage. Most of the varieties and kinds of vegetables recommended for small gardens may be grown successfully without further measures than those already stated.

Rodents present special problems, which must be met by group or community action on the part of gardeners.

RABBIT CONTROL

Among the pests which the home gardener finds specially trying are cottontail rabbits. They are more troublesome to home gardeners than to commercial growers, chiefly because most suburbs of cities have ordinances forbidding residents to shoot them, but partly because, on open farm lands, foods other than vegetables may tempt them.

Control measures include trapping in box traps and transporting into localities where they may be desired for game. Game wardens will assist both in trapping and relocating the cottontails.

Another control measure is the sprinkling of repellents on the soil about the plants. Among the most effective repellents are dried blood and naphthalene balls or flakes. Several materials have been suggested as sprays, among them nicotine extracts, Lysol, and magnesium sulphate.

VICTORY GARDEN CERTIFICATES

The registration of Victory gardeners by local or county Victory Garden Committees serves several important purposes. Among these may be listed the following:

1. It affords a measure or serves as a census of Victory gardeners, enabling the War Food Administration to evaluate the contributions of home gardens to our national food supply. Such an estimate is useful in determining policies concerned with food production, manpower, supplies of seed, fertilizer, insecticides, and other materials, and allocations of metals for manufacturing garden tools and equipment.

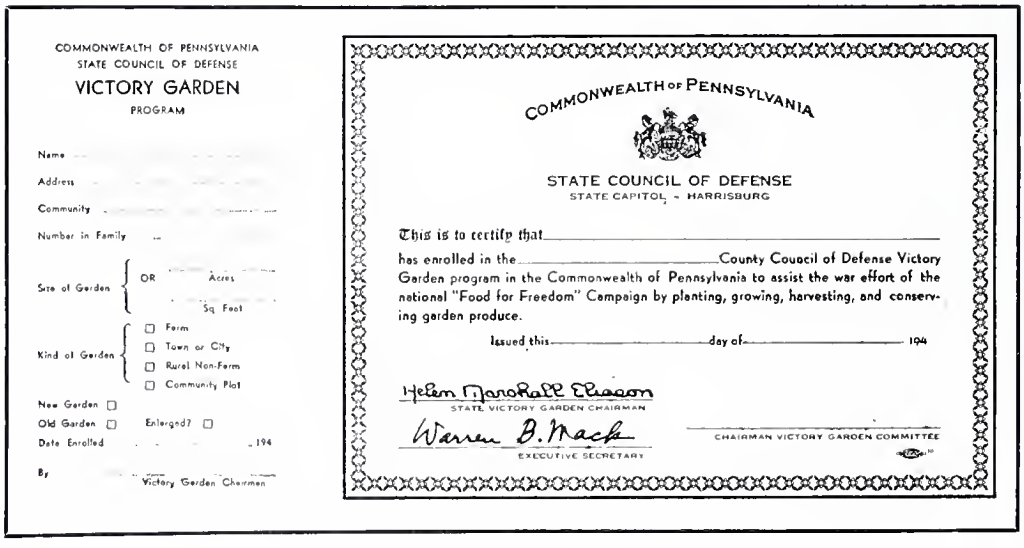
2. It provides a means whereby the Victory Garden Committee and other public agencies may reach individual families with information and assistance.
3. It reminds the family which is participating in the Victory Garden program that it is a worthy part of the nation's war effort.

Registration should be carried out in a uniform manner throughout the State. Every effort should be exerted to include therein as many home gardeners as possible. To this end, wherever it is possible to do so, it may be expedient to conduct the registration in connection with other organized canvasses in which every home is surveyed.

In some communities, Boy Scouts have assisted in reaching every home by going from door to door, to provide the opportunity for each family to enroll with the utmost convenience.

To expedite the registration, forms such as that illustrated herewith are provided for county and local Victory Garden Committees by the Pennsylvania State Council of Defense. The portion on the left-hand side of the form (outside of the decorated border) is filled in by the Victory gardener, and is turned in to the Victory Garden Committee, to provide statistical information on Victory gardening. The remainder, enclosed within the decorated border, is filled out by the chairman of the respective Victory Garden Committee and is presented to the home gardener as a certificate of participation in the Victory Garden Program, an important part of the national effort.

VICTORY GARDEN CERTIFICATE



COMMONWEALTH OF PENNSYLVANIA
STATE COUNCIL OF DEFENSE
VICTORY GARDEN
PROGRAM

Name
Address
Community
Number in Family
Size of Garden — OR Acres / Sq. Feet
Kind of Garden — ☐ Farm ☐ Town or City ☐ Rural Non-Farm ☐ Community Plot
New Garden ☐
Old Garden ☐ Enlarged? ☐
Date Enrolled _____ 194
By _____ Victory Garden Chairman

COMMONWEALTH OF PENNSYLVANIA

STATE COUNCIL OF DEFENSE
STATE CAPITOL - HARRISBURG

This is to certify that _____
has enrolled in the _____ County Council of Defense Victory Garden program in the Commonwealth of Pennsylvania to assist the war effort of the national "Food for Freedom" Campaign by planting, growing, harvesting, and conserving garden produce.

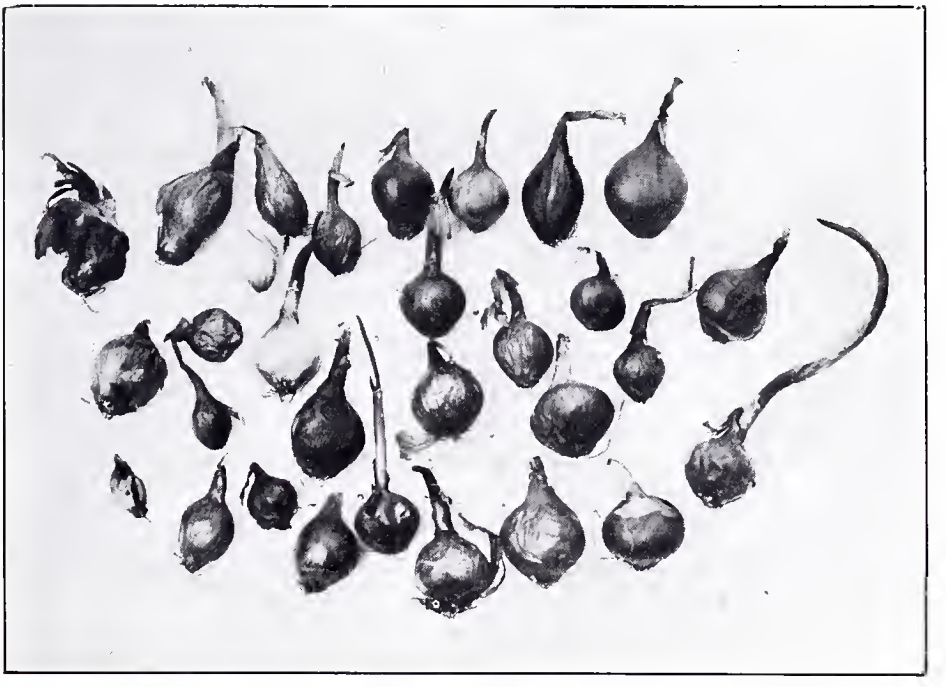
Issued this _____ day of _____ 194

Helen Harkness Ellerson
STATE VICTORY GARDEN CHAIRMAN

Warren B. Mack
EXECUTIVE SECRETARY

_____
CHAIRMAN VICTORY GARDEN COMMITTEE

Mrs. Hiram B. Eliason, in foreground, Chairman of Victory Gardens for the War Services, Pennsylvania State Council of Defense.



Onions from Victory Gardens Add Flavor to Wartime meals.

Photograph by Philadelphia Inquirer

Mrs. H. Elliott Pew, Chairman, War Relief Division, Emergency Aid of Pennsylvania, Philadelphia, operating a tin can sealer in a kitchen devoted to canning garden surpluses for civic purposes.

UTILIZATION AND CONSERVATION OF FRUITS AND VEGETABLES

Wastage of foods or any other useful products which require human effort and resources must be considered as antisocial at all times and as sabotage at present. Wastage, moreover, may assume many forms besides simple decay of fruits and vegetables, either in the fields or piled high in the market.

Less obvious types of wastage of garden products occur when they are harvested either before or after they have attained their greatest food values; when they are prepared for the table or are stored or preserved without regard to the retention of their most important food values; and when they are chosen for culture or for the family dietary in kinds and proportions which do not assure that the nutrient needs of the family are supplied. Too much of one kind may be wasteful, even if the family consumes every bit of that kind which is forthcoming.

To avoid wastage in all its forms, production, preservation, and utilization of food should be planned carefully. It is not sufficient to prepare a food budget for the year, and a garden plan which will provide the vegetables and possibly the small fruits required in the annual food budget. The plantings must be planned so that foods not adapted for preservation can be used without oversupply as they mature; kinds that are adapted for storage may reach proper maturity in the late fall, when climatic conditions are favorable for home storage; and kinds that may be canned, frozen, or preserved by other methods are ready to harvest at such a rate that they can be handled with the facilities available.

Furthermore, the family dietary should be planned week by week, so that full quotas of all the required nutrients are supplied in an appetizing, stimulating variety.

If the home garden can not be made to produce all the fruits and vegetables that are required, as usually will be the case with all families except those living on general farms, it will be necessary to purchase those which are needed but are not provided from the home garden. Some planning can be done advantageously in connection with fruit and vegetable purchases.

Forecasts of commercial production are available, which indicate probable supplies and prices. If the expected supplies of staple products such as potatoes, winter apples, and citrus fruits are likely to be sufficient, the family may assume that these may be purchased as needed throughout the season when they are available. Perishable

fruits and vegetables which are available during a short season from nearby sources should be purchased and preserved for future use, especially if supplies are abundant or surplus, even if the quantity obtained is greater than the amount estimated as required by the family. This is recommended because unforeseen shortages may occur, and some margin of safety is desirable; it should not be considered as hoarding in any sense.

PREPARE FRUITS AND VEGETABLES FOR USE SO AS TO RETAIN NUTRITIVE VALUES

Conservation of food values should be kept in mind whenever fruits and vegetables are prepared for the table. Trim away only the parts which are not edible. If skins are objectionable or indigestible, pare or peel thinly, because minerals, vitamins, proteins, flavor, and frequently color are most concentrated near the surface.

Use fruits and vegetables raw if they are palatable and readily digestible in this condition. When these foods are served diced, sliced, shredded, or grated, however, these operations should be done as late as possible before the product is to be eaten, to avoid loss of flavor and nutritive value through oxidative processes.

Many vegetables and fruits, however, may be cooked without notable losses and in some cases even with gains in availability of nutrients, if cooking is done rapidly, in as short a time as possible, with the minimum of water and with light and air excluded, and without discarding the cooking water. Preparation of garden products, like slicing or shredding, should be done as short a time as possible before the food is to be eaten.

PRESERVE THE NUTRITIVE VALUES AS WELL AS THE EDIBLE QUALITY OF GARDEN PRODUCTS

It is not enough simply to preserve foods in edible condition for future use; in addition to the most acceptable flavor, the chief nutritive values of each fruit and vegetable should be retained to the fullest possible extent. Attention must be paid, therefore, to the chief nutritive values of each fruit and vegetable, and to the methods of preservation which will result in their maximum retention, and at the same time will keep the edible quality as high as possible.

The most common and practical methods of holding garden products for future use, together with their influence on the retention of the various nutrients contained in vegetables and fruits, are the following:

1. **Storing** in cool cellar, cave, pit, or other storehouse. Only the kinds of fruits and vegetables which develop relatively slowly may be held for any considerable period. Losses of carbohydrates, fats or oils, proteins, vitamin A, and vitamin C occur, less if the

storage temperature is low, more if it is higher. At lower temperatures, changes of flavor of greater or lesser consequence may take place during prolonged storage.

2. **Canning** in sealed glass jars preserves almost any fruit or vegetable for an indefinite period. About the only loss is that of vitamin C, which varies from almost all, in nonacid vegetables, to very little, in acid fruits packed after brief pre-cooking or exhausting to drive out air. Color and flavor may be changed by canning, particularly in nonacid vegetables.
3. **Drying, evaporating, or dehydrating** causes loss of vitamin C particularly, and also to a lesser extent of vitamins A and B_1, unless the product is properly steamed or blanched before drying. Flavor and color also are changed unless vegetables are blanched. Products may be damaged by insects if these are not excluded, and by molds unless kept in a dry place. Because flavors of many dried vegetables are different from those of the fresh or canned products, home conservers of food should be certain that dried products are acceptable to the family before processing any considerable quantity in this way.
4. **Freezing** rapidly after proper preliminary treatment (blanching, slicing, or sugaring as the product may require) conserves practically all of the nutrients.
5. **Brining and fermenting** results in considerable losses of vitamin A; some of the sugars are converted to acid, which is the preservative agent.
6. **Pickling** by cooking with vinegar or other acid material, and sealing in metal or glass containers reduces the loss of vitamin C which ordinarily takes place in canning. Little is known about its effects on other vitamins.
7. Preserving with large proportions of cane sugar is not possible at present except with sirups other than cane sugar sirup.

The accompanying table lists the chief nutrients contained in the common fruits and vegetables together with the method of preservation which will retain these to best advantage, as well as the edible qualities of each.

TABLE VII

PRINCIPAL NUTRIENT VALUE (1) AND RECOMMENDED CONSERVING METHOD FOR EACH OF THE COMMON VEGETABLES AND FRUITS

Fruit or Vegetable	Principal Nutrient Value	Recommended Method of Conserving	Other Acceptable Methods of Conserving
Apples, summer	Energy, vitamins A, B_1,	Canning as sauce	Drying
Apples, winter	B_2, and niacin	Storage	Drying, canning
Apricot	Energy, vitamins A, B_1, B_2	Canning	Drying
Asparagus	Vitamins A, B_1, B_2	Pressure canning, freezing	Tips may be dehydrated
Bean, fresh lima and shell (2)	Protein, energy, vitamins B_1, B_2, C	Freezing, pressure canning	Drying
Bean, snap	Vitamins A, B_1, B_2	Pressure canning, freezing	Dehydration
Bean, soy, fresh (2)	Protein, energy, vitamins A, B_1, B_2, C, niacin	Pressure canning, drying	Freezing
Beet	Vitamins A, B_1, B_2	Storing, pickling	Pressure canning
Berries	Energy, vitamin A	Canning, freezing	Dehydration
Broccoli	Vitamins A, B_1, B_2, C	Freezing	Dehydration
Cabbage	Vitamins B_1, B_2, C	Storing, sauerkraut	
Cabbage, Chinese	Vitamins A, B_1, B_2, C	Storing	
Carrot	Energy, vitamins A, B_1, B_2	Storing	Pressure canning, dehydration
Cauliflower	Vitamins B_1, B_2, C	Storing	Freezing, pickling
Celery	Vitamins A, B_1, B_2, flavor	Storing	Dehydration (for flavoring)
Cherries	Energy, vitamins A, B_1	Canning	Freezing (sour)

Corn, sweet	Energy, vitamins A, B_1, B_2	Pressure canning, freezing	Dehydration
Cucumbers	Vitamins B_1, B_2	Pickling, brining	
Currants	Energy, Vitamins A, B_1, C	Jellies, jams	Drying
Eggplant	Vitamins A, B_1	No satisfactory storage	
Endive	Vitamins A, B_1, B_2	Storing	
Gooseberry	Energy, vitamins A, B_1, C	Canning, jam	
Greens	Vitamins A, B_1 B_2, C	Freezing	Pressure canning, dehydrating
Herbs	Flavor, vitamins A, B_1, B_2	Drying	
Kale	Vitamins A, B_1, B_2, C	Storage	Dehydrating
Leek	Vitamin B_1, flavor	Storage	Dehydrating
Lettuce	Vitamins A, B_2	No satisfactory storage	
Mushroom	Vitamin B_1, flavor	Pressure canning	Dehydrating
Muskmelon	Energy, vitamins A, B_1, B_2	No satisfactory storage	
Okra	Vitamins A, B_1	Pressure canning, freezing	Dehydrating
Onion	Energy, flavor, vitamins B_1 B_2	Storage	Dehydrating (for flavoring)
Pea, green	Protein, energy, vitamins A, B_1, B_2, C	Freezing Pressure canning	Dehydrating
Peach	Energy, vitamins A, B_1, B_2	Canning, freezing	Drying
Pear (3)	Energy, vitamins B_1, B_2	Canning	Drying

(1) Excluding minerals which are not affected by storage methods.
(2) Mature beans are stored dry.
(3) Winter varieties may be stored.

TABLE VII (continued)

PRINCIPAL NUTRIENT VALUE (1) AND RECOMMENDED CONSERVING METHOD FOR EACH OF THE COMMON VEGETABLES AND FRUITS

Fruit or Vegetable	Principal Nutrient Value	Recommended Method of Conserving	Other Acceptable Methods of Conserving
Pepper, hot	Flavor, vitamins A, B_1, B_2, C	Drying	
Pepper, sweet	Vitamins, A, B_1, B_2, C, niacin	Pickling	Dehydrating
Plum	Energy, vitamins B_1, B_2	Canning	Dehydrating
Potato	Energy, niacin, vitamins B_1, B_2	Storage	
Pumpkin	Energy, vitamins A, B_1, B_2	Storage, pressure canning	Freezing, dehydrating
Radish	Flavor, vitamins B_1, B_2, C	Storage winter varieties only	
Rhubarb	Energy, vitamins A, B_1	Canning	Dehydrating
Rutabaga	Energy, vitamins B_1, B_2, C	Storage	
Spinach	Vitamins A, B_1, B_2, C, niacin	Freezing, dehydrating	Pressure canning
Squash, summer	Energy, vitamins B_1, C	No satisfactory storage	
Squash, winter	Energy, vitamins A, B_1, B_2	Storage, pressure canning	Freezing, dehydrating
Sweet potato	Energy, vitamins A, B_1, B_2	Storage	Pressure canning, dehydrating
Tomato	Vitamins, A, B_1, B_2, C	Canning	
Turnip	Energy, vitamins B_1, B_2, C	Storage	
Watermelon	Vitamins A, B_1, B_2	No satisfactory storage; rinds may be pickled	

(1) Excluding minerals which are not affected by storage methods.

A FAMILY BUDGET OF GARDEN PRODUCTS TO BE CONSERVED

As a guide for the selection and preservation of a well-balanced store of food for the family, one needs only to refer to the table presented earlier, on page 48, in which are listed the recommended annual allowances of the different kinds of vegetables for each member of the family, and from this to estimate the proportion of the entire amount of each group that will be needed during the period when local supplies are not available.

This need not be done for each kind, because the season of local harvest of certain kinds is very short, and thus it would appear that practically the whole crop would have to be preserved. Different kinds within each group may be found, however, which are harvested, some now, some then, during the growing season. Each of the kinds within a particular group, it should be remembered, yields about the same nutrients as the others in that group, and therefore may serve as a substitute for the others. For this reason, it is necessary to use only very small quantities, if any, of preserved or stored foods during the season when fresh vegetables are being harvested locally. A greater variety in the diet will be enforced if this general principle is observed.

The accompanying table on page 90, shows estimates of fruits and vegetables to be preserved for the different members of the family, if each is to be well nourished from home supplies, in parts of the country in which the local harvesting season for fruits and vegetables extends from early May to the end of October. It is assumed that a full supply of fruits and vegetables will be available from home supplies during about five months of the year on the average, since only a few kinds would be harvested during May, early June, and late October.

The amounts of each group of vegetables and fruits shown in the table on page 90, together with proportional amounts from fresh supplies during the local season, would supply all that are needed for best nutrition of the family. Not all of those which are required out of the local season need be preserved or stored, of course, if supplies are obtainable from the markets, shipped from distant sources. For self-sufficiency during the war, however, when means of transportation are needed for military purposes, the amounts shown are proper goals for each family.

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TABLE VIII

AMOUNTS OF THE DIFFERENT CLASSES OF VEGETABLES AND FRUITS TO BE PRESERVED OR OBTAINED FROM OTHER THAN LOCAL FRESH SOURCES, FOR EACH MEMBER, IF THE FAMILY IS TO BE WELL SUPPLIED WITH VEGETABLES AND FRUITS THROUGHOUT THE YEAR

	POUNDS OF MAJOR GROUPS OF VEGETABLES AND FRUITS							
Family Member	Dry Beans, Soy Beans, Peas[1]	Leafy and Green Vegetables	Yellow Vegetables (except Sweet Potatoes)	Potatoes and Sweet Potatoes[1]	Tomatoes	Cabbage	Other Vegetables	Fruits
Average Man	33	71	35	182	77	30	61	113
Average Woman	16	91	35	156	77	30	53	87
Boy 16-20 Years	33	81	41	234	77	30	81	163
Boy 13-15 Years	16	81	41	182	70	30	74	146
Girl 16-20 Years	13	84	35	130	62	30	59	169
Girl 13-15 Years	16	84	35	156	62	23	53	95
Child 10-12 Years	13	81	35	130	46	23	61	118
Child 7- 9 Years	10	71	35	104	46	19	53	94
Child 4- 6 Years	3	51	26	91	38	19	30	64
Child 1- 3 Years	0	41	20	65	30	19	20	38
Child 9-12 Months	0	30	15	52	24	0	9	19

[1] Because vegetables in these groups usually are harvested all at one time, the entire amount either is stored or obtained from other than home sources.

WHEN TO HARVEST VEGETABLES AND FRUITS FOR BEST PRESERVATION OR STORAGE

Fruits and vegetables, whether for immediate use or for preservation by different methods, should be harvested as nearly as possible at the best stage of maturity for the particular purpose. Because it is not the same for all products or for every purpose, the proper stage for harvesting of each of the common fruits and vegetables, for each use, is listed below.

Vegetables

Asparagus. Shoots for canning, freezing, or immediate use should be cut close to the ground when they have attained a height not to exceed six or seven inches; if taller than this, the base of the shoot as harvested is likely to be woody, and will have to be cut off as waste anyway. For drying, shorter tips than for canning and freezing are desirable.

Beans. Fresh lima, vegetable soy, and green shell beans should be picked when the seeds are full-sized but before they become firm and hard.

Beans, snap or string for canning, may be harvested from the time when the pods are two-thirds their full size (shoe-string) until the seeds have reached about one-half their mature size. For freezing,

younger stages likewise are preferable; for drying, pods should be fully grown, but seeds should not have begun to become firm.

Beans, dry shell, dry soy, or dry lima, should be allowed to remain on the plant until the pods are dry, but before these have begun to split and curl.

Beets for canning should be small and tender but well colored; for storing they may be fairly large but should be harvested before they have become coarse-fleshed or have faded in color. Best texture, color, and flavor of beets are attained if the crop matures in cool fall weather.

Broccoli for all uses should be harvested before flower buds are enlarged or are showing traces of yellow color. After terminal heads have been harvested, smaller heads will develop on side branches. Harvest the head and the tender portion of the stem beneath it.

Cabbage for all uses should be fully developed and firm; loose heads, however, may be used in kraut.

Carrots for canning should be tender, but deep orange color should be present well down toward the tip of the root; for storage, they should be well matured, firm but not fibrous, and well colored. Roots for storage should be planted for the purpose, so as to mature in the late fall.

Cauliflower heads for storage or freezing should be fully grown but should be harvested before the sections begin to separate. Leaves should be tied together over the head as it develops if a clear white color is desired. Heads which are loose, partially damaged, or otherwise not suitable for storage may be used in mixed pickles or may be pressure canned.

Celery for storage should be fully grown and free from pithiness, from blight infection, and from mechanical or other injury. Some blanching will occur during storage in trench, pit, or coldframe, but not in cold storage. Blanching is not necessary to produce a good flavor and tender texture; its chief effect is in appearance. Coarse outer stalks and poorly developed plants may be cut and either stewed, dehydrated for flavoring, or used in mixed pickles. Roots and all except damaged leaves are left on plants for trench or pit storage.

Corn, sweet, should be harvested for all purposes preferably during the morning or early forenoon, when the kernels are fully grown, but before the contents of the kernels have changed from milky to doughy.

Cucumbers may be harvested for pickles at any time after they are two inches long until full size is obtained, but before seeds have begun to become tough and the flesh about them to become watery. The total weight of cucumbers harvested from the vines does not differ very much, regardless of the size at which they are harvested, provided that they are harvested uniformly at that size, and none is allowed to become overgrown or to ripen.

Eggplant should be harvested before the seeds become tough and dark in color.

Endive is best when grown in the cool seasons of the year; for salads, outer leaves should be tied together over the heads to blanch them, reduce bitterness, and improve tenderness. If plants are stored in trenches or coldframes, some blanching will occur there.

Kale. Young leaves may be harvested during the cooler seasons. Usually plants are allowed to stand in the garden until freezing weather, and the cluster of young, tender leaves is harvested with the growing tip for immediate use; for storage, some older leaves are included for protection.

Leeks are most acceptable when they are harvested during cool fall weather. They may be covered with straw or leaves and allowed to stand throughout the winter where they grew, or they may be harvested and stored as is celery.

Lettuce, leaf, for best flavor, tenderness and nutritive value is harvested when the leaves are no more than four or five inches high, and not fully grown, as is the usual custom. Head lettuce, however, is allowed to become full-grown and firm, but not tip-burned or bolted (that is, with seed-stalk beginning to elongate). Succession plantings of leaf lettuce are highly recommended for home gardens.

Mushrooms should be harvested for all uses before the under surface of the cap (the gills) has begun to turn brown. Any size may be used, but for appearance the sizes are graded.

Muskmelons should be allowed to ripen on the vine, or to attain at least the half-slip stage—that is, the stage at which the stem partially separates from the fruit. The full-slip stage, at which the stem separates readily from the fruit, is preferable for home use.

Okra pods, like cucumbers, can be harvested at any time after they are large enough, but before they become overmature, or in the case of this vegetable, tough and fibrous.

Onions, like cucumbers or okra, may be used at any time after they are large enough, but they do not become overmature, unless they are grown from large sets, in which event some may develop seed stalks. For storage, onions should be fully mature and tops should be shriveled when they are pulled; they should be dried; and tops should be removed before they are placed in storage, in ventilated crates, baskets, or bags.

Peas, green (called English peas in the South), are best for canning, drying, or immediate use if the seeds have attained nearly full size but have not lost their tenderness. If they become overmature, they may be allowed to ripen, when they can be stored dry, as in the case of navy or kidney beans.

Peppers, hot, usually are allowed to ripen fully and even to begin to

shrivel before they are harvested and dried for grinding. Tabascos may be picked when fully grown, either green or red, to be used in mixed pickles.

Peppers, sweet (called mangos in certain parts of the North), are allowed to reach full size, when they may be picked green or allowed to develop their ripe color, yellow or red, according to variety. **Pimientos** when fully ripe but not shriveled may be canned as are fruits.

Pumpkins and winter squashes for storage or canning should be fully mature and the rinds should be hard. For baking, Acorn or Table Queen squashes may be harvested as soon as they are fully grown, though the flavor improves with maturity.

Radishes may be harvested as soon as they are large enough but before they become corky or pithy. Varieties for winter storage should be allowed to reach full size but should not be planted so early that they have time to become fibrous before weather is cool enough for storage.

Rhubarb is harvested for all purposes by pulling some of the outer leaves of the plants as soon as these leaves are fully grown. Leaves may be pulled from time to time until midsummer, but care should be exercised not to exhaust the plants.

Rutabagas and turnips for storage should be well developed but not oversize and corky. For immediate use, they may be pulled at any time after the globe-shaped or flat ones are two inches in diameter. Good yields can be assured by proper spacing of plants for the desired sizes.

Spinach, like lettuce, can be harvested at any time after the plants are large enough to suit one's taste, but before seedstalks have started to develop. Smooth-leaved varieties are preferable for home use; they are preferable for canning if grown in the fall.

Squash, summer, may be harvested at any time up to the stage when the rind and seeds begin to harden.

Squash, winter. (see **Pumpkin**)

Sweet potatoes for immediate use may be dug at any time after they are large enough; for storage, they should be mature enough that cut surfaces dry on exposure to air, without oozing or darkening. In the North, they should be harvested before hard frosts.

Tomatoes for slicing can be harvested as soon as the fruits are a good red throughout; for canning, a deep red color is preferred, though flavor is somewhat better if fruits are not dead ripe. Most home-canned tomatoes, however, are harvested before they are ripe enough for best flavor.

Turnip. (see **Rutabaga**)

Watermelons should be allowed to ripen on the living vine, for good flavor. Some expertness is required to judge ripeness by the appearance of the fruits, but it can be done.

Fruits

Apples, summer. For cooking or canning as sauce, summer apples may be picked as soon as the ground color has begun to change from green to yellowish green or yellow. Fruits should all be harvested before they become mealy or soft. Dessert varieties should be harvested when the ground color has changed, but before softening is noticeable, and should be held in a cool place until sufficiently soft for eating raw.

Apples, winter. For all uses, winter apples are picked when the mature color has been developed, and when most of the stems will separate from the supporting spurs as the apple is twisted upward with a little pressure against the stem. If such separation is too easy, many fruits are likely to drop during harvest, or if winds come.

Apricots. For canning, drying, or immediate dessert use, apricots should be fully colored and soft though not mushy; for holding during several days, as for shipping or distant marketing, ripe color should be developed and slight softening begun.

Berries, except strawberries, for all uses must be ripe enough to separate readily from their attachments to the bush, but should not be over-soft.

Cherries, sour, for canning, freezing, drying, or fresh use should be permitted to ripen fully, until deep, dark red color has been attained. Flesh will be firmer, fruit will be larger, and flavor much richer if full ripeness has developed. Most growers of sour cherries for home use harvest the crop prematurely.

Cherries, sweet, likewise improve in quality until fully, though not dead, ripe.

Currants and gooseberries, like sour cherries, develop best flavor, color, and size if allowed to ripen fully on the bush.

Peaches for canning should be picked when well colored and beginning to soften, but before they are fully softened; for freezing or drying, they may be somewhat riper than for canning.

Pears, like summer apples, should be picked while firm, but after the ground color has changed from bright green to yellowish green, and when the most of the stems will separate from the spur when the fruit is turned upward, with pressure against the stem. They should be held in a cool place until moderately soft and juicy before they are either canned or dried.

Plums and prunes should be fully ripe but not dead ripe at harvest for all uses except shipment to distant markets. Prunes do not

become so soft as do the larger varieties of plums and may shrivel before becoming very soft. Harvesting should be complete before shriveling occurs.

Grapes should be allowed to develop a dead ripe color before being harvested but should be picked before the berries shatter or fall off from the cluster.

HOME CONSERVATION OF VEGETABLES AND FRUITS

Preparation of Garden Products for Conserving

In general, garden products which are to be conserved by canning, freezing, drying, or dehydrating should be harvested at the best stage for eating immediately, and *should be prepared for processing, and processed as rapidly as possible.* If such preparation requires much more than an hour or so, the crop should be gathered piecemeal. Best quality generally is obtained during the forenoon, or before slight wilting of leaves takes place, as often happens on hot afternoons. For storage in cool or cold cellars, caves, trenches, or pits, products will keep better if they are harvested when fully developed, and in the case of fruits, fully colored, but before they have begun to soften or before they have fully matured.

Only sound, unbruised products free from disease should be placed in cool or cold storage. Only good quality fruits and vegetables should be conserved by any method. Canning, drying, and freezing will not produce a good product unless the material was good to begin with.

For cool or cold storage of raw products, the products generally are prepared as for market, though they are not so closely trimmed as a rule. For example, a few more leaves are left on cabbage, a few more stalks on celery, and somewhat more of the top is left on root crops such as turnips, rutabagas, beets, and carrots, than would be on the respective vegetables as prepared for marketing directly.

For canning, freezing, pickling, fermenting, or dehydrating, fruits and vegetables generally are prepared as they would be for immediate cooking and eating.

Fruits may be canned or frozen without sugar, though they retain color, shape, and size more fully during canning if some sugar is used; if no sugar or sirup is added before freezing, some should be placed on the fruit as it is thawed. Salt is added to vegetables before canning, at the rate of one teaspoonful to the quart. *Canning powders should not be used.*

SOURCE MATERIAL ON CONSERVING

Complete and very helpful instructions on home canning may be found in Farmers' Bulletin No. 1762, *Home Canning of Fruits, Vegetables, and Meats,* which may be obtained by individuals from the Office of Information, United States Department of Agriculture, Washington, D. C., free as long as the supply in this office lasts; thereafter, they may be obtained for five cents a copy from the Superintendent of Documents, Government Printing Office, Washington, D. C. (Congressmen usually have a supply of Government publications, which they furnish free on request to constituents.)

Courtesy, Bureau of Nutrition and Home Economics

The boiling water bath may be used for acid vegetables, such as tomatoes. A wash boiler or a metal tub with a homemade rack of wood or wire should be a part of the equipment of every Victory Garden Conservation Kitchen. For home use, a metal pail, a deep pot, or a large lard can will serve.

Other publications from the same sources of value to home producers and conservers of fruits and vegetables are Farmers' Bulletin No. 879, *Home Storage of Vegetables*; Farmers' Bulletin No. 900, *Home-made Fruit Butters*; Farmers' Bulletin No. 1918, *Drying Foods for Victory Meals*; and Farmers' Bulletin No. 1438, *Making Fermented Pickles.*

For timely information on the subjects consult your county agricultural agent or home economics extension representative.

PROCEDURES AND TIMES FOR PROCESSING

The following table, taken partly from Farmers' Bulletin No. 1762 of the United States Department of Agriculture and partly from other sources summarizes briefly the procedures in canning fruits, tomatoes, and acid foods. As suggested above, fruits should be fully ripe for canning as a rule, though it is not desirable that they be too soft. If fruits are canned without sugar, juicy ones such as berries, cherries, plums, and grapes should be canned in their own juices; less juicy fruits such as apples, peaches, and pears require some added water, though the least necessary amount should be used. Fruits packed without peeling, such as plums and cherries, should be punctured to prevent bursting. Products are precooked until tender and packed boiling hot, or are packed cold and covered with boiling sirup as indicated.

TABLE IX

PROCESSING TIMETABLE FOR FRUITS AND ACID VEGETABLES IN GLASS JARS

KIND OF FRUIT OR VEGETABLE	STYLE OF PACK AND PREPARATION BEFORE PROCESSING	MINUTES TO PROCESS AT DEGREES FAHRENHEIT (BOILING WATER) *
Apples	Sauce or butter, packed hot.	5 - 10
	Sliced, pared apples, steamed or boiled to wilt packed hot, covered with hot sirup or water.	15
	Baked, cored apples, packed whole, hot, covered with hot sirup.	10 - 15
	Apple cider, cleared, heated to 180 degrees F., filled into hot jars.	25
Apricots	Halves or whole fruits heated to boiling, packed hot in hot sirup.	20
	Packed raw, covered with hot sirup.	25
	Precooked and packed hot in juices.	5

* Times given above are for altitudes up to 1000 feet above sea level; for each additional 1000 feet of elevation, add one minute when time shown is 20 minutes or less, and two minutes when it is longer.

Time is counted from the moment that water in the bath covering the jars has begun to boil vigorously.

TABLE IX (continued)
PROCESSING TIMETABLE FOR FRUITS AND ACID VEGETABLES IN GLASS JARS

KIND OF FRUIT OR VEGETABLE	STYLE OF PACK AND PREPARATION BEFORE PROCESSING	MINUTES TO PROCESS AT DEGREES FAHRENHEIT (BOILING WATER)
Beets, pickled	Precooked peeled, sliced or diced, packed hot, and covered with hot vinegar with sugar to taste.	30
Berries, except strawberries	Packed raw, covered with a hot sirup made by boiling small and imperfect berries with sugar to taste.	15 for firm fruits 20 for soft
	Precooked with sugar in own juice and packed hot.	5
Cherries	Packed raw, unpitted, covered with hot juice or sirup.	25
	Brought to boil, packed hot, covered with hot juice.	15
	Precooked and packed hot.	5
Currants	Precooked and packed hot.	5
Gooseberries	Precooked in sirup to shrink, packed hot, and covered with hot sirup.	5
	Packed raw, covered with juice of part of berries cooked with sugar as desired.	20
Peaches	Peeled, packed raw, covered with hot sirup.	25 for soft, 35 for firm
	Brought to boiling, packed hot, and covered with hot juice and sirup.	20
	Precooked and packed hot.	5
Pears	Pared, cut in half and cored, cooked in boiling water or sirup 4 to 8 minutes according to firmness, packed hot in jars and covered with juice.	20
Pimientos, ripe	Peeled after immersion in hot oil (290° F.) for 2 to 3 minutes or exposure for 6 to 8 minutes in hot oven (450° F.) and dipping in cold water; removing stems and seed cores, and packing folded in jars with one-half teaspoonful of salt, without added liquid.	40 (pints only)
Pineapples	Pared, cored, trimmed, sliced, and heated in sugar to taste for 10 minutes to draw out juice, packed hot, and covered with hot juice.	25
Plums and Prunes (fresh)	Precooked in small amount of sirup, packed hot in jars, and covered with hot juice.	15 - 20
Rhubarb	Precooked until soft with sugar enough to sweeten to taste, packed hot into jars.	5 - 10
Sauerkraut	Heated to simmering (180° F.), packed hot into jars, covered with hot sauerkraut juice.	25 minutes, pints 30 minutes, quarts

TABLE IX (continued)
PROCESSING TIMETABLE FOR FRUITS AND ACID VEGETABLES IN GLASS JARS

KIND OF FRUIT OR VEGETABLE	STYLE OF PACK AND PREPARATION BEFORE PROCESSING	MINUTES TO PROCESS AT DEGREES FAHRENHEIT (BOILING WATER) *
Strawberries	Brought slowly to boiling with sugar, let stand over night, heated quickly to boiling, and packed hot into jars.	5 - 15
	Heated in oven at 250° F. with sugar for 1 hour, packed hot in hot jars, covered with hot juice.	5 - 15
Tomatoes	Dipped into boiling water for one minute, then into cold, peeled, cored, trimmed of green spots, packed tightly into jars, covered with tomato juice.	45
	Quartered, heated to boiling in own juice, packed hot into jars.	10
	Precooked and packed hot.	5
Tomato juice	Cored, trimmed, simmered at 170° F. to 180° F. until soft, sifted at once through fine sieve, filled hot into jars with one-half to one teaspoonful of salt to the quart.	15
Fruit juices	Fruits crushed (or pitted and crushed) with one-half cup water per pound (none with berries), heated to 180° F., strained, heated again with sugar to taste, to 160° or 170° F., filled into jars.	5
Fruit purees	Cooked until soft, passed through fine sieve, heated to 160° to 170° F., filled hot into jars with sugar to taste.	20

Sirups are made by adding sugar to water and dissolving by warming and stirring. The proportions of sugar to water to make light, medium, and heavy sirups, and the fruits for which they are used are shown in the accompanying tables.

TABLE X
QUANTITIES OF SUGAR TO ONE GALLON OF WATER FOR DIFFERENT DENSITIES OF SIRUP

SIRUP	SUGAR TO 1 GALLON OF WATER				PER CENT. OF SUGAR OR DEGREE BALLING
	by measure		by weight		
	Cups (½ pint)	Quarts	lb.	oz.	
Light	5	1¼	2	2	20
Moderately light	8	2	3	10	30
	10	2½	4	8	35
Medium	13	3¼	5	9	40
	15½	3⅞	6	13	45
Moderately heavy	19	4¾	8	6	50
	23¼	5⅞	10	3	55
Heavy	28	7	12	8	60

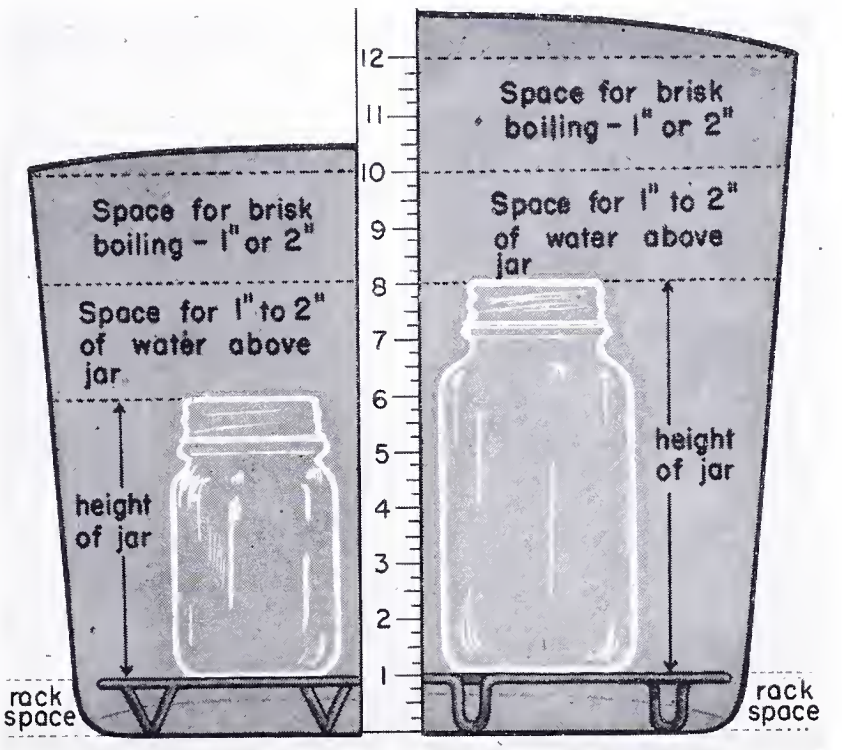
KINDS OF FRUIT	DENSITY OF SIRUP TO USE
Apples, pineapple	light sirup
Peaches	light or medium sirup
Berries, sweet cherries, currants, pears, plums	medium sirup
Sour cherries, gooseberries, rhubarb	heavy sirup

Lighter sirups than specified may be used to conserve sugar. Strawberries and rhubarb may be cooked or baked with one-fourth their weight of sugar, instead of the heavy sirup ordinarily used for very sour products.

Nonacid vegetables, or all those other than tomatoes, rhubarb, ripe

Courtesy, Bureau of Nutrition and Home Economics

Ample room, at least one to two inches, must be provided above the jars in the boiling water bath method of canning fruits and acid vegetables.



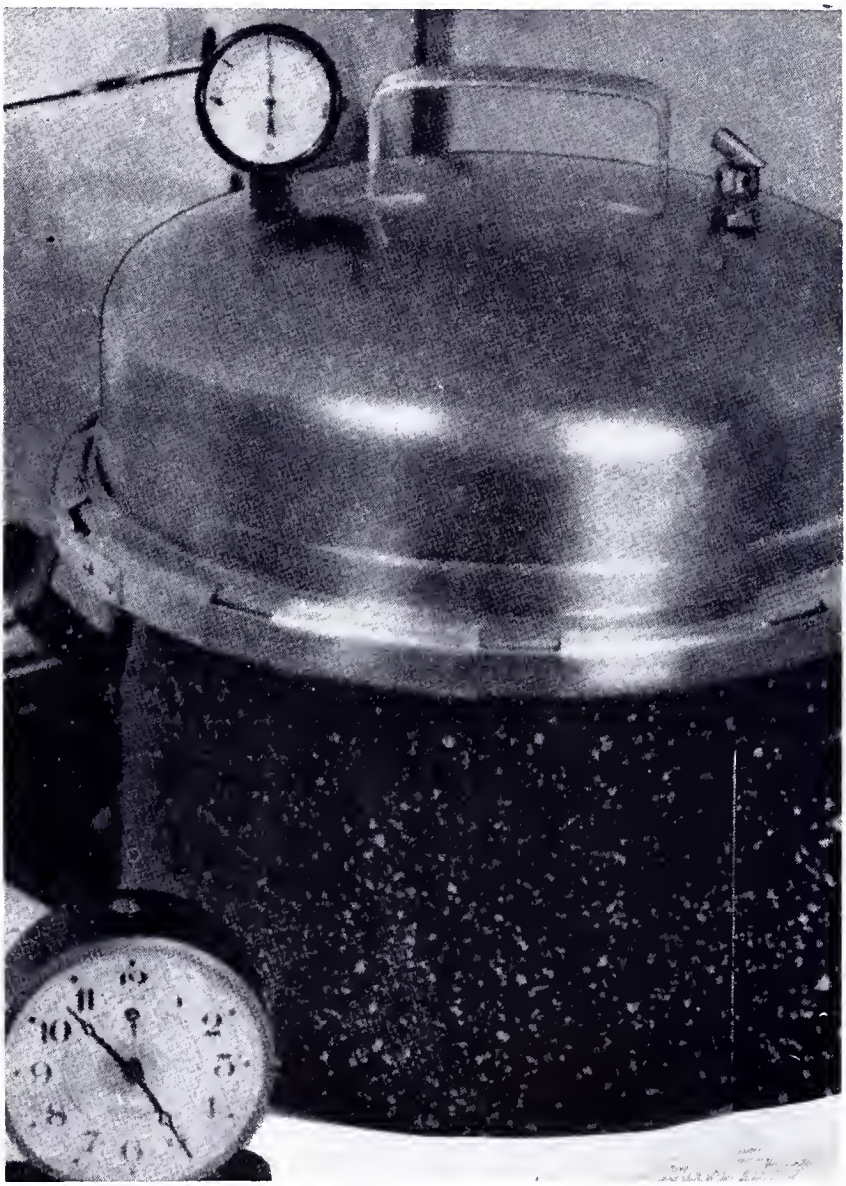
Courtesy, Bureau of Nutrition and Home Economics

Ample space should be left above the jars for proper processing by the use of the boiling water bath; left, pint jar, right, quart.

pimientos, and pickled beets or other vegetables must be processed at a temperature of 240 degrees Fahrenheit or higher. To attain these temperatures, which are required to be sure that all organisms which might cause spoilage are destroyed, a pressure cooker or canner must be used. To quote from the United States Department of Agriculture Farmers' Bulletin 1762, "If a pressure canner is not available, then drying, brining, or some method of preparation other than canning should be used for these vegetables."

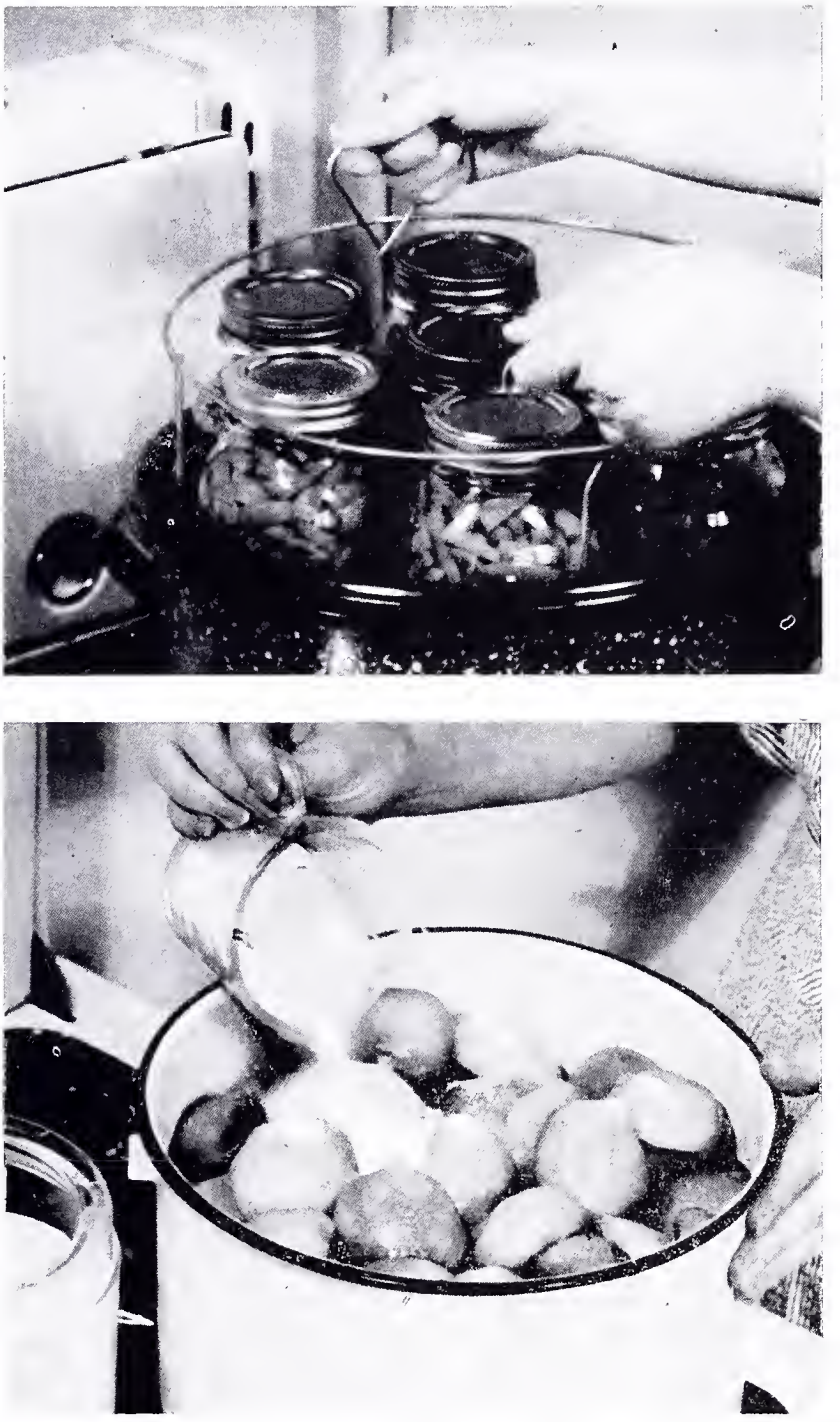
Vegetables in general are washed thoroughly, trimmed, and either cut, diced, sliced, or broken as for cooking for immediate use. All except small beets and carrots are blanched or scalded by immersing in boiling water from two to five minutes or until heated through or wilted, and then are packed hot into jars, covered with water in which they were blanched, salted, sealed, and processed at once. Beets are cooked for about 15 minutes or until the skins slip easily, then are peeled, packed in jars, covered with boiling water, salted, sealed, and processed. Carrots are pared or scraped, cooked until tender, and large ones are sliced or diced; they then are packed hot into jars, salted, sealed, and processed.

All are processed at once in the pressure canner at a temperature of 240 degrees Fahrenheit for home canning in glass jars, and during the time shown in the table on page 104. To attain this temperature, a pressure of 10 pounds per square inch is required for altitudes up to 1000 feet above sea level; for each additional 1000 feet, the pressure is increased by one-half pound per square inch. Processing time is counted from the moment the pressure has reached that required, and heating the canner is discontinued immediately at the end of



Courtesy, Bureau of Nutrition and Home Economics

The pressure cooker should be used in canning all nonacid vegetables.



Courtesy, Bureau of Nutrition and Home Economics

(Above)—Removing canned beans from the pressure cooker; (below)—Fruits, such as peaches, may be canned by heating to boiling, with sugar, in an open kettle, then packing hot into jars, and finally processing in a boiling water bath.

the time specified. Thereafter the canner is permitted to cool as rapidly as possible, but without opening the petcock until the pressure has fallen to zero. If pressure is reduced before the temperature in the jars has fallen, the liquid contents will boil and be partially expelled through the rubber gasket by which the jar is sealed.

When the pressure has reached zero, the petcock is opened, and the cover is raised so that any steam or hot vapors in the canner will escape away from the operator.

Glass jars with all types of covers except the two-piece metal ones with composition rubber gasket sealed into the cover disk are only partially sealed while being processed, and are completely sealed when they are removed from the pressure canner. Jars with two-piece metal covers having sealed-in gaskets are sealed completely before being placed in the pressure canner, as are metal (tin) cans.

TABLE XI

PROCESSING TIMES AT 240 DEGREES FAHRENHEIT (10 LB. PRESSURE*) FOR NONACID VEGETABLES IN GLASS JARS, RECOMMENDED BY THE U. S. BUREAU OF HUMAN NUTRITION AND HOME ECONOMICS

Kind of Vegetable	Time of Processing in Minutes	
	Pint Jars	*Quart Jars*
Asparagus	35	40
Bean, green lima	45	55
Bean, snap or string	30	40
Bean, green soybeans	60	70
Beet	40	45
Carrot	40	45
Corn, whole kernel	65	75
Greens	95	105
Okra	35	40
Okra with tomatoes	25	35
Okra with whole-kernel corn and tomatoes	65	75
Peas, green or English	45	
Peas, black-eyed	45	55
Pumpkin	85	105
Squash	85	105
Sweet potato	100	110
Vegetable soup mixtures	60	70

* For altitudes up to 1000 feet above sea level; for each additional 1000 feet in altitude, increase the pressure by one-half pound. *Pressure gauges should be checked frequently.*

ADDITIONAL HINTS AND PRECAUTIONS ON PREPARATION OF FRUITS AND VEGETABLES FOR PROCESSING

Fruits and Tomatoes

The fruits and vegetables for which the method of preparation is described below *should be processed at once at the temperature and during the time shown for each, respectively, in the foregoing tables.*

Apples for pies are pared, cored, and cut into pieces of the desired size. Pieces are kept from discoloration during this process by being placed in a solution of 2 tablespoons each of salt and of vinegar in one gallon of water. Pieces after short heating to wilt are packed tightly with as little juice as possible to cover. For sauce, they may be precooked after trimming and quartering, but without paring, and then passed through a fine sieve. Windfalls may be used for sauce; bruised spots should be trimmed out.

Apricots. See peaches.

Berries. Blackberries, blueberries, boysenberries, currants, dewberries, huckleberries, loganberries, and raspberries should be handled in shallow vessels to prevent crushing, and should be canned as soon as possible after picking. Remove stems and other foreign matter; wash by dipping several times into clean water, using a colander to hold berries. Sort out small and imperfect fruits, and precook these with sugar to make juice for covering larger berries in jars.

Cherries may be canned pitted or unpitted; for eating as desserts, usually they are unpitted, but for pie baking they preferably are pitted. When pitting, save all juice, and cook slowly for 5 minutes in juice before packing in jars. Large cherries canned without pitting should be punctured to prevent cracking of skins.

Currants. See berries.

Gooseberries. Remove shriveled blossoms from fruits while dry, before washing. Use ripe fruits only, and precook in sirup to shrink.

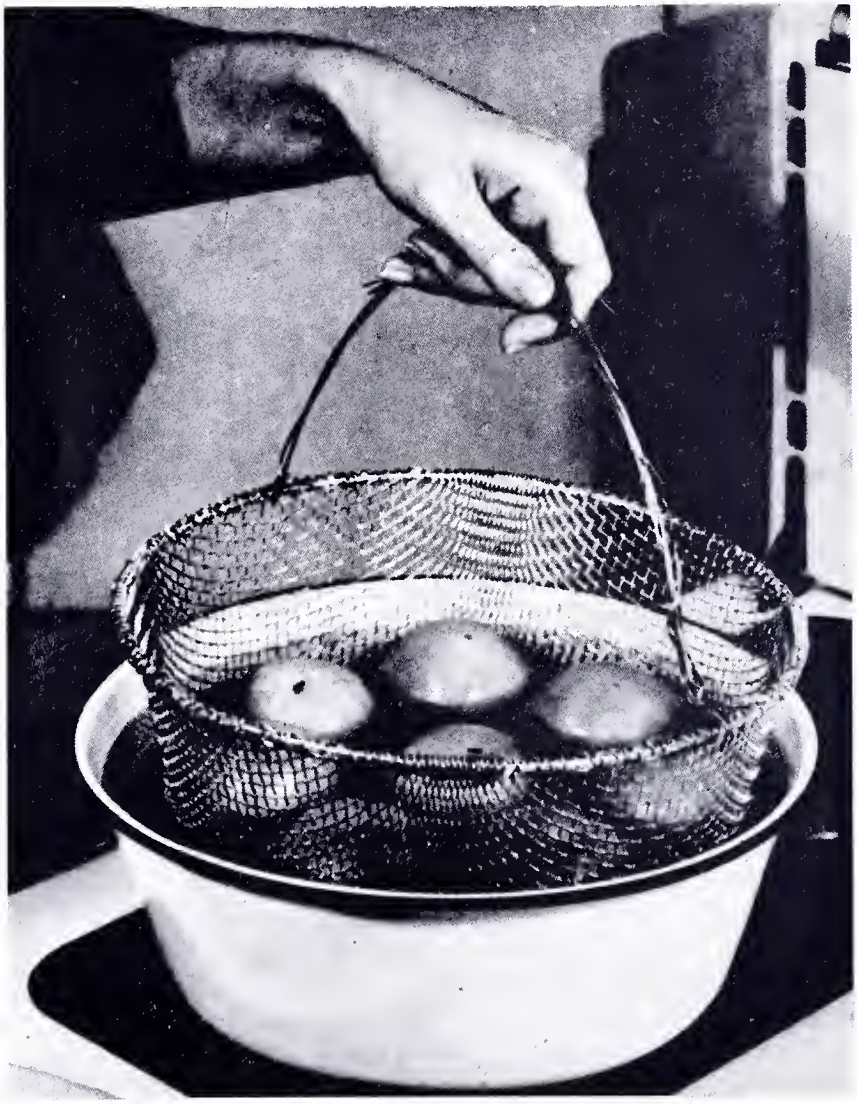
Peaches. For easy peeling, immerse in boiling water for one-half minute, plunge into cold water at once, and remove peel. Cut into halves, remove pits, and dip in salt and vinegar solution (see under apples) for two minutes to prevent browning. Lye peeling may be found advantageous in commercial or community canneries. By this method, fruits are immersed during 30 to 60 seconds in a boiling lye bath, containing 4 ounces of granulated lye to 2 gallons of water. Immediately after removal, the peaches are immersed in running water until the skins and the lye are completely washed away, and are given a two-minute dip in vinegar and salt solution to prevent browning. Lye-peeled fruit should be canned at once. A stronger lye solution (8 to 10 per cent.) at 135 to 140° F. may be used. Fruits may be canned as halves, though sliced peaches occupy less space.

Pears. Pare, cut into halves, core, and place into the vinegar-salt solution described above. Very juicy pears should be pre-heated slowly, without adding sugar.

Plum skins should be punctured to prevent bursting during pre-heating or processing.

Strawberries generally are preferred as preserves rather than as a canned fruit.

Tomatoes are peeled in the same manner as peaches, after immersing first in boiling and then in cold water about one minute and



Courtesy, Bureau of Nutrition and Home Economics

For satisfactory peeling of tomatoes preparatory to canning, use a rack to dip the tomatoes first in scalding hot water, then in cold.

a few seconds, respectively. White or green portions near the stem scar should be trimmed out completely; for this purpose, a tomato peeling knife with a short, spoon-shaped blade is preferred.

Tomato Juice. Use stainless steel knives for cutting and trimming fruit and avoid cooking vessels of iron, copper, or brass; otherwise a metallic flavor will be found in the processed juice. Best flavor in tomato juice is attained simply by canning tomatoes whole, and passing through a fine sieve at the time that the juice is to be used.

Vegetables

Asparagus. Sort shoots according to diameter, tie in uniform bundles, and set upright with the bases of the shoots in boiling water deep enough to cover the less tender portion. Cook for 2 to 3 minutes and pack hot into jars, for whole spears. For cut stalks, cut into short pieces, boil 2 to 3 minutes, and pack into jars while hot, covering with water in which pieces were boiled.

Beans, snap. Break off stems, but leave tips of stringless varieties because they will be tender and because vitamins are concentrated in the tip portion of the pods. Tender beans may be broken more rapidly and fully as satisfactorily as cut.

Beans, soy. Green or vegetable soybeans may be shelled most readily if pods are boiled for a few minutes, after which they may be split open very easily.

Beets. Use young, tender beets preferably, though larger ones may be diced or sliced. Cut off leaves, leaving about an inch of the leaf stalks attached to the beet, and leaving also the tap root during cooking; wash thoroughly, and cook until the skin slips off readily.

Corn. Husks and silks may be removed most easily if the tip and butt of the ear are cut off with a sharp knife, before husking. For home canning in glass jars, the whole-kernel style of pack, in which kernels are cut from the cob without subsequent scraping, is the only one recommended, because of the difficulty in obtaining heat penetration into cream-style corn during processing. Cut deeply enough to obtain most of the kernel, but not so deeply as to include objectionable hulls.

Greens. (beet greens, chicory, collards, dandelion, escarole or broad-leaved endive, kale, mustard greens, rape leaves, spinach, Swiss chard, turnip greens, and wild greens). Pick over, sorting out damaged or dead leaves, weeds, and foreign matter. Wash thoroughly through several changes of water, immersing and agitating the leaves in the water and lifting therefrom, to avoid the settling of dirt and grit on leaves that will occur if water is drained off. Precook by covering greens with water heated to simmering, and cook in an uncovered vessel for about 5 minutes, or until greens are wilted

throughout. Lift from water, pack moderately but not too tightly into jars, and cover with cooking water, adding one-half teaspoonful of salt to the pint.

Mushrooms. Wash thoroughly, drop immediately into cold water containing one tablespoonful of vinegar to the quart. Place in wire sieve, cover with lid, and precook for 3 to 4 minutes in boiling water containing one tablespoonful of vinegar and one teaspoonful of salt per quart, then chill by immersing in cold water briefly. Pack into jars at once, and cover with freshly boiling water containing one teaspoonful of salt to the quart. Process immediately.

Okra. Use only tender pods; wash, cover with water, bring to boiling, and pack hot into containers. To mix with tomatoes or tomatoes and corn, wash okra pods and slice crosswise; peel, core, and trim tomatoes as described above, and cut into sections; cut corn as for whole kernel corn, and combine as desired. Add a small amount of water, heat to boiling, and pack hot. Process as described in the table presented previously.

Peas, green. Shell, wash, and simmer in hot water during 5 minutes. Pack hot into pint jars, cover with hot water in which they were preheated, and add one-half teaspoonful of salt to the jar.

Pumpkin and Squash. Pare, remove seeds and supporting tissues, cut into cubes up to one and one-half inches in dimensions. Simmer in a small amount of hot water until heated through, with occasional stirring. Pack hot, add one teaspoonful of salt to the quart, and cover with hot water in which it was preheated.

Sweet Potatoes, if mature and sound, preferably should be stored; damaged ones, however, can be saved by canning. Wash thoroughly, trim, and steam or boil until skins come off easily. Peel at once, cut into pieces as for pumpkin, and pack while hot into jars. Cover with boiling water, adding one teaspoonful of salt to the quart jar. Process at once, as shown in the table.

Jars and Covers

Any glass jar may be used which can be sealed air-tight, and of which the opening is large enough that foods may be filled in conveniently. For practical considerations, however, jars should be obtained for which the standard covers or closures readily obtainable on the market may be used. The jars should be free from cracks, and the upper surface of the brim should be smooth and free from chipping, especially if the two-piece metal cover is used, with a sealed-in rubber gasket which presses against the upper surface to make the seal. The threads by which the cover is screwed on, if screw-covers are used, should be of standard pitch; this may be tested by trying on one of the standard covers.

Four types of covers or closures are in use:

(1) Mason tops, consisting of a zinc screw cap with a glass or porcelain disk secured into the inside of the top, and with a flat rubber ring or gasket, fitting between the lower edge of the metal cap and the shoulder of the jar. No new covers of this type are available, but old ones can be used repeatedly until they are either cracked or corroded; or until the glass or porcelain disk is broken. Rubber rings are obtainable.

(2) Three-piece covers, with a threaded metal band, a glass or porcelain disk which fits inside the upper rim of the metal band, and a rubber ring or gasket which is held around the margin of the under surface of the glass disk, by means of a circular ridge or flange which is part of the disk, and which is held between the disk and the upper surface of the brim of the jar to make the seal, when the metal band is screwed on tightly. All parts of this cover are available to home canners.

(3) Two-piece metal covers, consisting of a threaded metal band and a metal disk with a composition gasket sealed fast around the margin of the under surface of the disk, and forming the seal by being pressed firmly against the upper surface of the brim of the jar when the metal band is screwed on tightly.

(4) Lightning tops, consisting of a glass cap and a rubber gasket fitting upon a shoulder on the outer rim of the jar. The glass cap presses upon this gasket to make the seal, when a two-piece wire clamp is pressed into the closed position. The rubber rings or gaskets used with this type of cover are the same as those for the Mason or zinc top, described above.

All types are satisfactory if they are used properly. The two-piece metal cover is the only one which will withstand pressure from the inside as well as from the outside of the jar, and consequently is the only one which is sealed tightly as soon as the jar is filled, before processing. All others are only partially sealed: the Mason and the three-piece covers are turned down tightly, and then are turned back about one-fourth of a turn, before processing, and are finally sealed by screwing tightly, immediately after processing. Lightning tops are held in position during processing by placing the upper wire loop over the cap, but the lower loop is not pressed downward to complete the seal until after the process is complete.

If zinc tops are dented along the rim or margin, they may be straightened so as to insure a good seal by holding the cap with the rim against a flat, smooth surface, and smoothing out dents or ir-

regularities by tapping or pressing with the back of a knife blade or with the metal handle of a kitchen knife.

HEAD SPACE IN JARS

To allow for expansion of contents during processing, glass jars should not be filled completely to the top; a head space of one-half inch should be left empty at the top of the jar for all except starchy vegetables, for which the space should be one inch high, measured from the rim of the jar to the surface of the contents.

FILLING JARS

Jars, before being filled, should have been washed thoroughly with hot water and soap, and rinsed. When they are to be filled with hot material, they should be heated by immersing in hot water.

To keep the brim and shoulder free from food particles which might prevent a proper seal, a broad funnel designed for the purpose should be used. Any particles which may be deposited on the sealing surfaces should be removed before the cover is put into place.

RUBBER JAR RINGS

Rubber jar rings should be of good quality, elastic enough to be bent double and pressed without cracking, or to return to the original size when stretched to twice its original length. Certain wartime rings made of reclaimed rubber only, may impart undesirable flavors to foods; they should be washed in warm soapy water and boiled briefly in a quart of water with a tablespoonful of soda, for each dozen rings. A further precaution against this trouble is to keep food out of contact with the rubber ring, by observing directions concerning head space, processing in an upright position, and always keeping the jar in this position during handling, cooking, and storage.

CANNING IN METAL CONTAINERS (TIN CANS)

While there is little if any advantage in tin cans over glass jars for home canning of fruits or acid vegetables, which are processed in boiling water, the metal container offers distinct advantages for packing nonacid vegetables which require temperatures above 212 degrees Fahrenheit for safe processing. Because tin cans of suitable sizes are available without restriction for packing of foods which are not to be sold, consideration should be given to these containers for nonacid vegetables, particularly in community canning kitchens where commercial-type equipment may be provided, and foods are to be packed for community uses, emergency stores, or school lunch. This subject will be discussed later, under *Community Food Conservation Centers.*

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Home Canning of Meats

Meat for preserving should be from healthy, well-grown animals only, which have been killed and handled in a strictly sanitary manner. In drawing or dressing, extreme care should be taken not to tear or cut the digestive tract, or to permit its contents or the contents of the gall bladder to come into contact with the meat. Blood should be drained carefully from the carcass, and the meat should be chilled thoroughly. Unless artificial refrigeration is available, slaughtering should be done in cold weather; approximately 12 hours are required to chill large fowls, 24 to 36 hours for pork, lamb, or veal, and 36 to 48 hours for beef. Meat should not be permitted to freeze during chilling, nor should it be salted before chilling.

After chilling, the meat is wiped dry with a clean cloth and is cut as for home use. Excess fat, gristle, and dark or injured portions are trimmed off. The bone is removed and the meat is cut into as large pieces as possible, up to a size sufficient to fill a can, preferably in such a way that the grain is lengthwise of the container when it is packed. Pieces that are too small to be served as roasts or steaks are canned for stews, and scraps are ground for hamburger or sausage.

Tables on which meat is cut should be scrupulously clean, and preferably covered with a water-proof surfacing material. Wooden blocks or tables should be cleaned by scraping, because water will carry dissolved or suspended matter into the wood as it is absorbed. Vessels of iron or copper should be avoided for pre-cooking meats, because they tend to discolor it.

Meat is parboiled until about one-third cooked, or is seared or browned before packing hot into cans. Young chickens may be fried as for serving. Broth from parboiling or pre-cooking is saved to cover meat in the containers. Salt is added at the rate of one to two teaspoonfuls to the quart, according to taste.

The temperature of the meat in the center of the can or jar should be 170 degrees Fahrenheit, when it is placed in the processing vessel.

All meats should be processed at 250 degrees Fahrenheit, the temperature of steam under a pressure of 15 pounds to the square inch, at altitudes up to 1000 feet; increase the pressure by one-half pound for each additional 1000 feet of altitude.

Processing times are as follows: beef or pork roast, beef steaks, pork chops, poultry roast or fried, 85 minutes for pints (No. 2 cans,) 120 minutes for quarts (No. 3 cans); beef, pork or chicken stew meats, 70 minutes for pints, 100 minutes for quarts; sausage, 90 minutes for pints, 125 minutes for quarts. Hamburger, 90 minutes for pints (larger sizes should not be used); hash, 70 to 85 minutes for pints and 100 to 120 minutes for quarts.

Freezing Vegetables and Fruits

A concise source of information on preparation of fruits and vegetables for frozen-locker storage is Extension Bulletin No. 208 of the Michigan State College Extension Division, East Lansing, Michigan, entitled *Preservation of Fruits and Vegetables in Refrigerated Food Lockers.* In it are shown in tables or charts the most desirable varieties of the different kinds of fruits and vegetables for freezing, instructions on harvesting and handling, preparation, sugar sirup concentration, dry sugar and dry pack methods for fruits, blanching time and packing directions for vegetables, and containers required.

In general, fruits and vegetables for freezing are harvested at the best stage for immediate use, are handled carefully to avoid bruising, and are prepared in the same manner as for cooking or canning. Vegetables must be handled rapidly for freezing, as for canning, to insure good quality. Sirups used for fruits are the same as for canning (page 100), and brines for vegetables contain 2 per cent. of salt, or 1 teaspoonful to 1 quart of water.

Cleanliness is even more important in preparation for freezing than for canning, because the freezing process does not sterilize the product. Fruits are considered best when served just before they are completely thawed. If dry packed, they should be thawed in sugar sirup or with added sirup. *All frozen vegetables should be cooked before they are eaten.* They may be cooked after thawing, but may be started to cook while still frozen, especially if brine packed; if dry-packed, they may be plunged into boiling salted water.

Drying and Dehydrating

Three excellent pamphlets on home drying and dehydrating or evaporation of fruits and vegetables are Oregon Agr. Experiment Station Circular of Information No. 274, entitled *Oregon's Food Dehydration Program* (Corvallis, Oregon); United States Department of Agriculture Farmers' Bulletin No. 1918 entitled *Drying Foods for Victory Meals*, and Circular 619 (revised 1942), *Preservation of Fruits and Vegetables by Commercial Dehydration*, which may be obtained free from the Office of Information, United States Department of Agriculture, Washington, D. C., as long as the supply lasts, after which they can be purchased for 5 cents and 10 cents respectively, from the Superintendent of Documents, Government Printing Office, Washington, D. C. Also available from the Victory Garden Committee, State Council of Defense, Harrisburg, Pa., is a bulletin entitled *Construction of Home and Community Dehydrators,* and from the Pennsylvania Agricultural Experiment Station, State College, Pa., Bulletin No. 448, entitled *A Community Dehydrater from Noncritical Materials.*

PREPARATION OF FRUITS FOR PRESERVING IN FROZEN LOCKERS

Fruit	Preparation	Per Cent. Sugar Sirup[1] to Cover	Dry Sugar or Dry Pack	Container[2]
Blueberries	Wash, drain, pack loosely in containers.	40 or 50	Avoid dry sugar; may be frozen dry.	
Blackberries Dewberries Boysenberries	Avoid unripe or overripe fruits; sort, wash, drain, pack loosely.	45 or 50	For pastry 1 part of sugar to 3 or 4 of berries.	Air-tight for dry pack
Cherries, sour	Use only when fully ripe, wash, pit, and pack rapidly.	60 (dry sugar preferred)	For pies, 1 part sugar to 4 of pitted cherries.	Air-tight
Cherries, sweet[3]	Use red or black varieties, fully ripe, do not bruise. Stem, wash, drain, pack loosely. May be pitted.	50	Not recommended unless pitted; 6-8 parts pitted to 1 part sugar.	Air-tight
Peaches[3]	Harvest firm, ripe before fruit is over-soft. Avoid bruising. Peel by submerging in boiling water, plunging in cold water and rubbing peelings off. Remove pit, cut each half into 4-6 slices, pack rapidly, leaving little head space in container.	40 or 50 Sirup must cover fruit. Seal quickly and rush to freezer to avoid browning.	Not recommended	Must be air-tight
Rhubarb	Pack early in season; trim off leaves and bases of stalks; wash and cut into 1-inch pieces; do not peel.	50	May be dry packed without sugar.	Air-tight
Red Raspberries	Harvest fully ripe berries when dry, in cool weather. Wash and drain thoroughly, do not crush in packing. Handle rapidly.	40 Rush to freezer.	Not recommended	Air-tight
Black Raspberries	Same as red raspberries, but are seedy for dessert use.		For use in pastry, 1 part sugar to 3 or 4 parts berries.	
Strawberries	Use firm, red-ripe berries; hull, wash, drain thoroughly; pack whole, or slice $\frac{1}{8}$-inch thick, or crush.	40 or 50	Mix 1 part sugar to 4-6 parts berries. If whole fruits, set over night in refrigerator.	Air-tight

[1] Sugar sirup of percentage as indicated (see Table X) should cover fruit in container.
[2] Unless air-tight container is specified, containers need not be air-tight.
[3] Peaches may turn brown unless handled rapidly without bruising; light-colored sweet cherries are likely to turn brown.

TABLE XIII
DIRECTIONS FOR PREPARING QUICK-FROZEN VEGETABLES

VEGETABLE	VARIETIES PREFERRED	HARVESTING, HANDLING, AND PREPARATION	BLANCHING TIME IN BOILING WATER[1]	PACKING	CONTAINER[2]
Asparagus	Mary Washington	For tips, 4½" lengths; for cut 1" pieces. Avoid iron utensils. Wash thoroughly.	minutes 2 - 3	2% brine or dry pack	Air-tight
Beans, Soup	Stringless green pod, Tendergreen Refugee, Kentucky Wonder	Avoid overmature or small pods; prepare for canning or cooking.	minutes 2 - 3	2% brine or dry pack	Air-tight for dry pack
Green Wax	Round-pod Kidney, Brittle Wax, Pencil Pod, Black Wax				
Beans, Lima	Fordhook, King of the Garden, Burpee Bush, Early Baby Potato, Henderson	Harvest when beans are full size but before they have started to harden; shell by hand; pick out white beans. Handle rapidly.	minutes 1½ - 2	Dry pack	
Broccoli	Italian Green Sprouting or Calabrese	Avoid yellow or tough heads; cut small pieces, using only tender stalks.	minutes 3 - 4	2% brine or dry pack	Air-tight
Brussels Sprouts	Long Island Improved	Use only medium-sized sprouts; remove outer yellow leaves.			
Cauliflower	Snowball, Snowdrift	Avoid discolored or spreading heads; trim, cut into small pieces.	minutes 2 - 3	2% brine	Air-tight
Corn, Sweet	Golden Cross Bantam, Golden Bantam	Harvest early in morning, in milk stage; husk, silk, and trim ears. Scald on cob 2 - 3½ minutes, cut from cob and pack.	minutes 8 - 10 for corn on cob	Cut corn packed dry; corn on cob wrapped singly in moisture proof material	Air-tight
Peas	Thomas Laxton, Little Marvel, Asgrow 40, Alderman	Avoid overmature pods; shell by hand, sort out overmature and immature peas and foreign matter. Pack rapidly.	minutes 1 - 1½	Dry pack	Air-tight
Spinach and Greens		Harvest as for table use, trim, wash thoroughly.	minutes 2 - 2½	Usually dry pack	Air-tight

[1] If steamed, blanch 50 per cent. longer. Blanching should be done by dipping vegetables in a wire basket or colander into a large volume of boiling water (about 3 gallons per pint of vegetable). As soon as the time is up, the blanched vegetables are plunged immediately into cold water.

TABLE XIV
DIRECTIONS FOR DEHYDRATING FRUITS AND VEGETABLES

Product	Trimming, Etc.	Preliminary Treatment		Tray Load per Sq. Ft. Lb.	Maximum Drying Temperature, Degrees F[3]	Average Drying Time, Hours	Dried Product	
		Type	*Time Minutes*				Characteristics	Percentage of Weights as Harvested
Apples	Peel, core, trim, cube or slice	Soak in salt water[1]	5	1½	135-155	8-10	Dry, springy	10-15
Apricots[5]	Wash, halve, stone	Soak in salt water	5	2	135-155	10-18	Dry, leathery	15-19
Berries	Wash, sort, drain	none	0	1	130-150	8-12	Dry but should not crumble	15-20
Cherries[5]	Wash, stem, pit large varieties	none	0	1	135-155	12-15	Slightly moist, sticky	18-30
Peaches	Halve, pit, peel	Soak in salt water	5	2½	135-155	18-22	Dry, leathery	14-19
Pears	Peel, halve, core	Soak in salt water	5	2½	135-155	18-22	Dry, leathery	12-17
Plums (large)	Halve, pit	Soak in salt water	5	2½	145-165	15-20	Dry, leathery	18-24
Prunes	Wash, stem	none	0	3	145-165	24-26	Skin dry, flesh moist	33-38
Beans, snap	Trim, wash, cut into 1-in. pieces	Steam[2]	15-20	¾	135-155	6-10	Dry, tough to brittle	8-12
Carrots	Wash, scrape, trim, dice, or slice	Steam[2]	4-8	1½	135-155	8-10	Dry, tough to brittle	8-12
Celery[4]	Trim, wash, slice or shred	Steam	1-2	1	135-155	8-10	Dry, tough	4- 8
Celery leaves	Wash, trim	Steam	1-2	½	135-155	3- 6	Dry, brittle	4- 8
Corn, sweet	Husk, steam, cut from cob	Steam	15-20	1¾	135-155	5- 8	Dry, brittle	8-12
Onions[4]	Trim, slice or shred	Steam	1¼	1¼	135-155	5- 8	Dry, crisp	10-14
Peas	Shell, clean	Boiling water	1¼	1¼	130-150	8-10	Dry, hard	9-14
Peas, sugar	Trim, wash, cut into 1-in. lengths	Steam	5 -10	¾	130-150	8-10	Dry, brittle	8-12
Spinach, greens	Trim, wash, drain	Steam	1	½	135-150	6- 8	Dry, crisp	3- 6
Sweet potatoes	Wash, scald, peel, trim, slice	Steam	8 -10	1½	140-160	8-10	Dry, brittle	15-20
Tomatoes[4 5]	Wash, scald, peel, core, slice	None or Steam	0-3	1¼	135-150	12-14	Dry, brittle	3- 7

[1] Stir pieces in cold salt water having 6 teaspoons of salt to the gallon, to prevent browning during handling.
[2] Place in wire basket loosely, suspend in covered kettle or boiler in which one inch of water is boiling vigorously until all pieces are relaxed or heated through. Times shown are approximate to bring this about. After steaming, spread on trays immediately and begin to dry.
[3] Higher temperature is that at start of drying; temperature should be lowered as drying progresses.
[4] These vegetables should be dried only for flavoring; to conserve best nutrient values, they should be preserved by other methods.
[5] Acid fruits should not be placed in contact with galvanized wire screen tray. Either wooden slat trays are used, or the wire screen may be covered with clean cheesecloth, paper towels, or brushed with melted paraffin, and prepared fruits laid upon these.

Drying reduces vitamin C greatly and vitamin A to some extent; the losses depend a great deal upon preliminary treatment and the time required for drying. In general, preliminary treatment or preparation for drying is the same as for freezing, except that fruits are not sugared, and vegetables after blanching are drained and placed immediately upon trays and dried, rather than being dipped in cold water and drained as they are for freezing. Brief directions for preparing fruits and vegetables for evaporating are given in the accompanying table, Table XIV, page 115.

Dried vegetables and fruits should be stored in a dry, cool place in insect-proof containers. They should be restored by soaking in water for several hours or overnight, and cooked in the soaking water except in case of fruits used in pastries.

It should be emphasized that drying or dehydrating may change flavors, especially of crops such as greens, and that not all dried products are easily stored. Certain dried products such as cherries and carrots take up moisture from the air and deteriorate, unless they are kept in moisture-proof containers. The acceptability of dried vegetables which are new to the family should be determined before any considerable quantities of such vegetables are dried or evaporated.

CONSTRUCTION OF HOME FOOD DEHYDRATORS

The conservation of fruits and vegetables during the season of local production, when the supply is abundant and quality is high, is an important part of the home food production program. While canning and freezing are preferable to drying for many vegetables and fruits, drying is a suitable method for certain ones and may be practiced when facilities are lacking or inadequate for other methods.

For these reasons, the following information on home and community drying equipment is released to Victory Garden Committees. The Department of Agricultural Engineering, Purdue University, Lafayette, Indiana, has issued a circular containing plans for constructing and methods of operating a small and a large family-size dehydrator heated with electric lamps and provided with an electric fan for forced air circulation. Plans for constructing several types of small home driers are available from the Agricultural Extension Service, State College, Pennsylvania.

Warming ovens on electric, gas, or other kitchen ranges may be used for drying small quantities of food. Some escape of humid air must be provided, and temperatures must be maintained as prescribed for each vegetable or fruit.

Specifications for a community dehydrator of 50-bushel capacity which is considerably greater than that of the one described in this bulletin, may be purchased from the Department of Agricultural Engineering, College of Agriculture, University of Georgia, Athens, Georgia, for $1.25 a set. The estimated cost of this large unit is $486.68, and priorities are required for certain of the materials and equipment specified. It is designed to operate with a 5-horsepower steam boiler, such as would be found in a community cannery.

Vocational agriculture schools which intend to construct such a dehydrator may obtain a description thereof, entitled *Constructing a Community Food Dehydrator*, Special Bulletin No. 9, March, 1943, in Course 15, The Rural War Production Training Program, prepared by the State Board of Vocational Education, Atlanta, Georgia, in co-operation with the University of Georgia.

A HOME EVAPORATOR

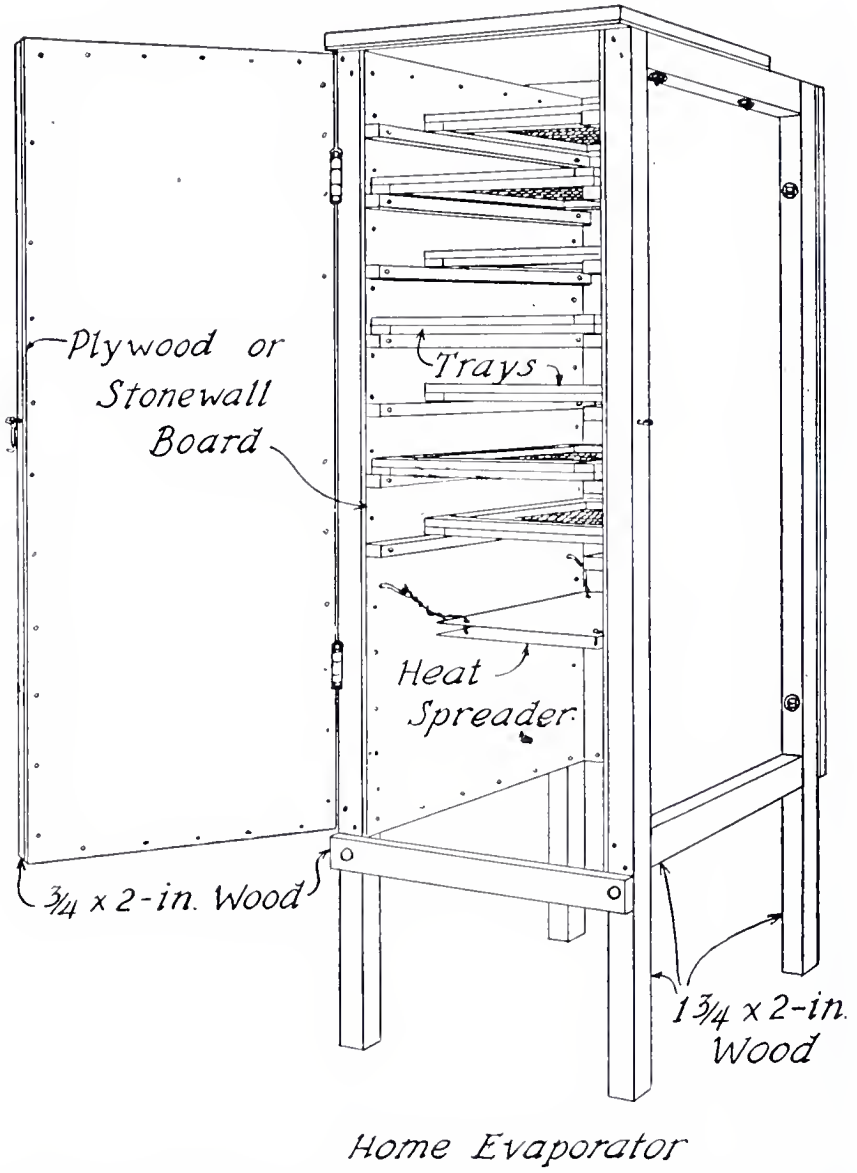
The home evaporator shown in the illustration is similar to one designed by W. V. Cruess and Lillian D. Clark of the University of California but is simpler to construct and can be taken down easily and stored in a considerably smaller space. The parts can be obtained cut to measure from the lumber mill, and any competent home carpenter can nail and bolt them together.

The side panels are three-eighths-inch fir plywood or Stonewall board (an asbestos cement board now available without priority), 30 x 48 inches; the door and rear panel are of the same material, but $19\frac{1}{2}$ by 48 inches; and the top panel is $19\frac{1}{2}$ by 24 inches. Side panels are nailed to the upright supports, which are five feet long, of $1\frac{3}{4}$ by 2-inch fir, redwood, or any light, non-resinous wood. The bottom and top of the plywood panels are nailed to cross-members of $1\frac{3}{4}$-inch by 2-inch wood, which are 26 inches long, to fit exactly between the upright supports, to which they are nailed with 4-inch finishing nails.

The door and rear panels are made rigid by nailing the $19\frac{1}{2}$ by 48-inch plywood pieces to $\frac{3}{4}$ by 2-inch strips around the margins. These strips, to fit exactly, should be $19\frac{1}{2}$ inches long for top and bottom. and 44 inches long for the sides. Similar strips for the top panel are $19\frac{1}{2}$ inches long for the crosswise strips and 20 inches for the other two. The rear panel is fastened to the upright supports of the side panels by means of 4 carriage bolts, $\frac{1}{4}$ inch in diameter and $3\frac{1}{2}$ inches long. The top panel is fastened to the top cross-members of the side panels in the same way.

Additional rigidity is provided by a cross brace of $\frac{3}{4}$ x 2-inch wood on the front upright supports, just below the door, attached by a $\frac{1}{4}$ x 3-inch carriage bolt at each end of the cross brace.

The door is attached to the front upright support of one of the side panels by means of a $2\frac{1}{2}$-inch gate hook and eye.



A home dehydrator, from "Construction of Home and Community Dehydrators," published June, 1943, by the Victory Garden Committee, Pennsylvania State Council of Defense.

The trays are $14\frac{1}{2} \times 24\frac{1}{2}$ inches, with bottoms made of galvanized wire screening or hardware cloth of $\frac{1}{3}$-inch or $\frac{1}{4}$-inch mesh. They are made by nailing $\frac{1}{2}$ by $1\frac{1}{4}$-inch strips of light wood above and below the hardware cloth, the top strips lapped in one direction and the bottom ones in the opposite direction for rigidity. If cross strips are $14\frac{1}{4}$ inches and side strips are $23\frac{3}{4}$ inches long, they will make a tray of the above dimensions.

Seven such trays may be accommodated in the cabinet, by nailing $\frac{3}{4}$ by 1-inch strips across the inside of the side panels, spacing them

4½ inches from center to center, with the top and bottom strips each 4⅛ inches from the top and 16⅛ inches from the bottom, respectively, of the side panel.

The trays are six inches shorter than the depth from front to rear of the cabinet. This allows them to be placed in alternate positions. one against the rear panel and the next against the door at the front, and provides for an oscillating draft of warm air upward through the cabinet when it is in use.

Heat is provided by a small oil or other stove, or by electric hot plates, grids, or other heaters totaling about 1000 watts. Fire hazard is reduced and even heating is insured by suspending two 12 x 18-inch pieces of sheet metal, one two inches above the other, at the bottom of the cabinet, over the stove, by means of wire loops attached to screw hooks inserted in the side panel.

Materials needed in addition to those specified above are ½ lb. of 3d box nails, ½ lb. of 4-inch finishing nails, and about ¼ lb. of 2-inch finishing nails. Hardware cloth should be cut into pieces 13½ by 24 inches.

Operating the Evaporator

It is not necessary that the evaporator be completely filled with loaded trays. It may be used with any number of trays from one to seven. It is not necessary that the drier be operated continuously. Several different varieties of fruits and vegetables may be dried at the same time.

Thermometer—Place the thermometer on the center of the lowermost tray.

Temperature—For vegetables, heat the lowermost tray to not above 140°F. and maintain a temperature range as nearly as possible to 140°F. until the products are nearly dry, when the temperature may be lowered. For fruits, begin drying at about 165°F. and lower the temperature to 130°F. or less as drying approaches completion. Because of higher sugar content, fruits do not require complete drying for their preservation. They should be dried, however, until they do not yield any moisture nor stick together when compressed.

The evaporator should be opened at intervals of one-half hour, more or less, and the fruits or vegetables on the trays examined and trays changed in position to cause uniform drying. When fresh fruits and vegetables are first placed in the evaporator, there is little danger of scorching, but when they become about one-half dried they scorch very easily and a slight scorching destroys the flavor. Therefore, during the latter stages of drying use less heat and regulate carefully.

Preparation of Vegetables for Drying

Gather the product in the cool of the morning, selecting for drying

that which is in prime condition for the table. A satisfactory dried product cannot be made from a wilted or inferior grade of fresh material. Prepare at once for the evaporator, because deterioration begins immediately.

Preparation of Vegetables that are to be Steamed

Steaming—Complete restoration of evaporated vegetables is necessary to render them satisfactory when prepared for the table, and can be obtained only by sufficient steaming previous to drying. Steaming saves the soluble food materials, sets the color, removes objectionable flavor, hastens drying by relaxing the tissues, checks ripening processes, and prevents undesirable changes in flavor after drying.

Preparation of Evaporated Products for the Table

Restoration—The principle of drying is the removal of sufficient moisture to prevent spoilage. This must be done at a temperature that does not injure the texture, color, and flavor of the vegetable or fruit.

The replacement of this moisture is accomplished by soaking the product in cold water for a time at least equal to that required for drying. A longer soaking is desirable, especially for beans. In general, overnight soaking is recommended.

Cooking—Place the product on the stove in the water used for restoration. Simmer—do not boil. As soon as tender, cease cooking as, like fresh products, they become overcooked and both texture, flavor, and vitamin content are destroyed.

BRINING AND FERMENTING VEGETABLES

Full information on brining and fermenting vegetables—chiefly cucumbers, though onions, cauliflower, green peppers, tomatoes, snap beans, beets, sweet corn, and cabbage are included—is given in Farmers' Bulletin 1438 of the United States Department of Agriculture, entitled *Making Fermented Pickles*. Sauerkraut and best methods for preparing it from cabbage are described in Bulletin No. 595 of the New York State Agricultural Experiment Station, Geneva, New York, and also in Circular No. 35 of the United States Department of Agriculture, entitled, *The Commercial Production of Sauerkraut*, obtainable for 10 cents a copy from the Superintendent of Documents, Government Printing Office, Washington, D. C.

In making fermented pickles and sauerkraut, utmost care must be exerted in all steps of the process, and utmost cleanliness must prevail, if spoilage is to be avoided and a good product insured. Because the process is itself fermentation caused by bacteria, chances of spoilage through the action of undesirable bacteria, yeasts, or other fungi are considerable unless the proper conditions for the desired fermentation are maintained.

These conditions include (1) cleanliness, (2) proper preparation and trimming of the product, (3) proper salting or brining, (4) exclusion of air, and (5) maintenance of the proper temperature.

For *sauerkraut*, these conditions are met as follows:

(1) Use clean utensils—paraffined wooden barrels or kegs or stoneware crocks—for fermentation vats, clean white muslin cloth to cover cabbage while fermenting, circular wooden or slate slabs just fitting inside the top of the vats, preferably stainless steel knives and cutters.

(2) Trim off outer leaves, quarter, remove cores or cut fine, and slice or shred so pieces are about the thickness of a dime or nickel.

(3) Mix not less than 2 nor more than 3, but *properly* $2\frac{1}{2}$ *per cent.* of dry salt evenly with the shredded cabbage. This makes *4 ounces of salt to 10 lb. of cabbage*, or *one lb. of salt to 40 lb. of shredded cabbage.*

(4) Pack evenly in the vat, adding at most 5 pounds of cabbage and 2 ounces of salt at a time. Do not bruise nor crush, but press firmly enough to force out air. The salt will draw enough moisture from the cabbage that the brine will cover it. Cover with clean white muslin cloth, on which the wooden or slate cover is placed. Add a weight heavy enough to bring the brine formed by the cabbage juice and salt to the *bottom of the cover.* A convenient weight is a crock in which water can be poured to obtain the right pressure.

(5) Hold at a temperature between 70 and 86 degrees Fahrenheit. At the lowest temperature, fermentation will require a month, and at the highest, ten days. The kraut produced at the highest temperature will be softer than that at the lower temperature.

When fermentation is completed in late fall, the kraut may be kept in the vat if it is stored in a very cool place, simply by skimming the surface occasionally and excluding insects, or by sealing the surface with hot paraffin poured around the cover. If sauerkraut is produced in summer, the easiest method of storage is to heat the kraut in its own juice to about 120°F., pack in glass jars, cover with juice, cover jar, cook in boiling water for 15 to 20 minutes, and seal.

Other vegetables which may be fermented in the same way are young and tender snap beans (without shredding), somewhat more mature snap beans if shredded, winter radishes, turnips, and rutabagas.

For *cucumber pickles*, the steps are the following:

(1) Use stoneware jars or paraffined wooden containers for fermentation, with wooden or slate slabs for covers, as for sauerkraut. Omit muslin cloth.

(2) Use pickling varieties preferably (National Pickling, Chicago Pickling, Boston Pickling, Snow's Perfection) though any variety can be pickled. Wash, trim to about $\frac{1}{4}$ to $\frac{1}{8}$ of the stem; do not bruise.

(3) Pack cucumbers in jar or barrel. In small lots use 6 quarts of 10 per cent. salt brine (containing *22½ ounces of salt to 6 quarts of brine*) to a 4-gallon jar; in larger containers, use 5-6 inches of 10 per cent. brine in the bottom, with a quart of good vinegar, and pack cucumbers into the brine. In either case, fill the container to a point near the top, and weight the cover sufficiently to hold the cucumbers well below the surface of the brine. Not more than a day later, add 1 pound of salt to each 10 pounds of cucumbers, placing this in the brine above the cover, so that it dissolves evenly throughout instead of settling to the bottom. This is necessary to keep up the strength of the brine. At the end of each week thereafter for 5 or 6 weeks, add 1 ounce of salt for each gallon of pickles, placing it on the cover as before.

(4) Adjust weight on cover so that brine remains always above it. From time to time, remove scum that forms.

(5) Keep temperature as nearly up to 86° F. as possible, especially at the beginning of fermentation. When all of the pickles have changed in color from pale green to dark or olive green, and all of the flesh is translucent and firm, fermentation is complete. This requires from 6 to 8 weeks.

The fermented pickles are preserved, after soaking to remove excess salt in water at 120°F. for 10-12 hours, as sour or sweet pickles, mixed pickles, or pickle relish.

For *sour pickles*, they are removed after soaking, drained, and covered with vinegar, either in stone jars, glass jars, or kegs and barrels for larger quantities.

For *sweet pickles*, they are covered with vinegar containing 4 pounds of sugar per gallon, usually after first soaking for about a week in plain vinegar. Spices are added, and more sugar later if desired.

Dill pickles are fermented rapidly in 5 per cent. brine with added dill herb and other spices. The brine contains 1 pound salt and 1 pint vinegar to 2 gallons of water. At the end of 10 to 14 days' fermentation, the pickles are canned by pack-

ing in jars with dill and spice, covering with brine previously heated to boiling and cooled to 160° F., then sealing.

HOME STORAGE OF FRUITS AND VEGETABLES

Crops which mature in the late fall, especially if their rate of development is relatively slow, can be stored raw or fresh for periods ranging from several weeks to four to five months. Storage may be out-of-doors, with more or less protection for certain crops; in a cold cellar or cave for other crops; and in an unheated room or attic of the house for others.

Outdoor Storage—For outdoor storage, the soil is the refrigerating and humidity-controlling agent; vegetables or fruits are kept cool and moist by being protected with the soil. Some vegetables, notably parsnips and salsify or oyster plant may be left standing during the winter where they grew, and harvested when the ground is thawed. Others, less hardy, are placed in trenches, mounds or pits, covered with straw or leaves to keep them clean and to insulate them somewhat, and the straw in turn is covered with sufficient soil to exclude frost from the stored produce. Barrels partly sunk in a slanting position in the soil and covered with straw and soil, or banked coldframes covered with a screen which in turn is covered with straw or leaves also may be considered as outdoor storages.

Trenches, often used for storing celery, Chinese cabbage, endive, or cabbage, are dug on a slight knoll to avoid the entrance of surface water, about two feet wide and 10 or 12 inches deep. Plants are set with their roots untrimmed, in moist soil at the bottom of the trench. They are protected by covering the trench with boards nailed together to form an inverted trough. When freezing weather is anticipated, the edges of the boards are covered with soil, and straw, leaves, or cornstalks are piled upon the boards. Soil is banked upon the straw, to a depth of 10 or 12 inches, and this in turn is insulated with a covering of cornstalks, straw, or strawy manure after it is frozen.

Barrels to be used as storages are sunk in a slanting position, covered with straw or leaves, and these in turn with soil sufficient to exclude frost. The open end of the barrel, which extends just above the surface of the ground, is covered with a closely fitting wooden lid, and this is covered with a large bag of straw or leaves. If fruits or vegetables containing seeds are placed in the barrel, it must be rodent-proof. The advantage of barrels as storages is that they permit more ready access than other outdoor storages.

Pits or mounds are used for outdoor storage of larger quantities of produce than might be placed in barrels or coldframes. They are

constructed by leveling an area four or five feet wide as long as necessary to include the produce to be stored. This area is covered with four or five inches of straw or leaves, and the vegetables are piled in a mound thereupon. These in turn are covered with leaves or straw, a layer of soil 10 to 12 inches deep, and an outer, insulating layer of straw, cornstalks, or strawy manure after the ground is frozen. Root crops, cabbage, potatoes, and apples may be stored successfully in this manner.

Cellars and caves for storage should be well insulated against frost, either by being sufficiently underground or by being banked with insulating materials such as those mentioned above. They should have earth floors to maintain sufficient humidity, and should have doors, windows, or other fairly large ventilators which may be opened and closed at will. Proper storage conditions are maintained in them by ventilating in the colder parts of the day if the weather is mild, or in the warmer parts if it is very cold. Humidity in cellars and caves may be raised by sprinkling the earth floors from time to time; if roots or leaf crops requiring high humidity are stored with other products requiring lower humidity, the roots may be covered with damp sand.

Practically all of the fruits and vegetables suitable for winter storage may be kept in cellars or caves, except onions, sweet potatoes, pumpkins, and squashes. These may be kept better in a cool, dry room, as may winter pears.

Where storage conditions are subject to control, the best conditions for storing common fruits and vegetables are those shown in the table on page 125. Ventilation is important in all storages.

For further information, send to the Office of Information, United States Department of Agriculture, Washington, D. C., for Farmers' Bulletin No. 879, *Home Storage of Vegetables*, and for United States Department of Agriculture Circular No. 278 (revised 1938), *The Commercial Storage of Fruits, Vegetables, and Florists' Stocks*; also, consult your County Agent for timely information from the Agricultural Extension Service.

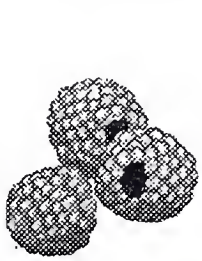


TABLE XV

BEST STORAGE CONDITIONS FOR FRUITS AND VEGETABLES

FRUIT OR VEGETABLE	TEMPERATURE DEGREES FAHRENHEIT	MOISTURE (RELATIVE HUMIDITY)	PERIOD OF STORAGE	PREPARATION AND SPECIAL MEASURES
	MEDIUM TEMPERATURE			
Pumpkin Squash	50-55	Dry (70-75)	2-6 months	Only sound fruits free from injury. Place on shelves, 1 to 4 deep, depending upon size. Handle very carefully. Do not remove stems.
Sweet Potato	50-55	Medium (80-90)	4-6 months	Dig before killing frost. Cure at 80-90°F. for 10 days with ample ventilation, and store in same crate in which harvested.
Tomato, green	55-70	Medium (85-90)	2-6 weeks	Only sound, fully grown fruits. Rate of ripening slower at lower temperature. No advantage in leaving on plants and hanging in storage.
	COOL TEMPERATURE			
Pepper, sweet (Mango)	32-50	Medium (85-90)	4-6 weeks	Pitting may occur in green fruits at lower temperature. Plants may be hung in storage.
Potato	36-50	Medium (85-90)	3-6 months	Sweetening occurs at temperatures below 40°F. but can be removed in a week or two at 60-70°; potatoes remain without sprouts longest at low temperature. Moderate sprouting does no harm.
Tomato, ripe	40-50	Medium (85-90)	10 days	Store in shallow tray, or 1 layer deep.
	COLD TEMPERATURE			
Apple	31-32	Medium (85-88)	2-6 months	Pack in baskets or crates with shredded paper to prevent scald. Length of storage depends upon variety.
Beet and Carrot	32	Moist (90-95)	1-3 months	Remove tops; store in baskets or slatted crates. In medium humidity cover with moist sand.
Brussels Sprouts Kale	31-32	Moist (95)	2-3 months	Leave in the garden until freezing weather; set whole plants with roots in damp soil.
Cabbage	32	Moist (90-95)	3-4 months	Leave a few wrapper leaves about head.
Celery, Chinese Cabbage, Endive	31-32	Moist (95)	2-4 months	Keep roots moist by setting in moist soil. Do not wet leaves in storage.
Grape	31-32	Medium (80-85)	3-4 weeks	Pick during fair weather, not soon after rain.
Horseradish	32	Moist (90-95)	4-6 months	May be left in ground over winter. Handle same as other roots in storage.
Leek, green	32	Medium (85-90)	1-3 months	Handle same as celery.
Onion	32	Dry (70-75)	5-6 months	If frozen, allow to thaw slowly without handling.
Parsnip and Salsify	32	Moist (90-95)	2-4 months	May be left in ground over winter.
Pear, winter	29-31	Medium (85-90)	2-6 months	Length of storage depends upon variety. Handle same as apples.
Quince	31-32	Medium (80-85)	3-4 months	Pack in baskets or crates.
Winter Radish, Rutabaga, Turnip	32	Moist (90-95)	2-4 months	Handle as other roots. Shriveling may be prevented by dipping in melted paraffin. Skin must be dry for this treatment.

PRESERVATION OF NUTRIENTS IN COOKING OR CANNING FRUITS AND VEGETABLES

Because there is some loss in certain of the vitamins as a result of various cooking and canning practices, it is the policy of most nutritionists to recommend that some fruits and vegetables be eaten raw at frequent intervals. This recommendation is sound until the body of scientific knowledge concerning changes in nutrient content of various foods is considerably larger than at present. There is an ever growing accumulation of evidence, however, that cooking and canning, if done properly, cause less severe losses in the nutrient content of fruits and vegetables than was formerly supposed, with some nutrients even increasing in amount with cooking.

A brief review of some recent studies in this field follows:

VITAMIN A

In experiments with cooking fresh and canned tomatoes, Clark[1] found no change in carotene (pro-vitamin A) content as great as 10 per cent. up to two hours of cooking fresh tomatoes harvested in the prime of the season. After four hours the carotene content was 11 per cent. higher than the initial value. When tomatoes harvested late in the season of generally lower nutrient value than the former were given a series of cooking treatments for different periods of time, the carotene content underwent no noteworthy change through two hours. After four hours of cooking, however, the tomatoes had decreased in carotene content about 38 per cent.

Another test on six varieties of tomatoes by this same author showed that the carotene content failed to decrease notably, and in some cases even increased slightly up to two hours of cooking. Fixsen[2] has reported that there was little or no loss in vitamin A in cooking tomatoes for the time ordinarily used. De and Majundar[3] have found that the carotene content of most foodstuffs is not decreased appreciably by boiling in water.

In unpublished work at The Pennsylvania State College, the carotene content of vegetables has been found to experience no notable losses, and frequently distinct gains in this pro-vitamin by carefully controlled commercial and home canning procedures. Subsequent cooking of the canned product, however, tended to produce greater losses in this pro-vitamin than were found when cooking the fresh vegetable. Hence short cooking periods of canned vegetables are recommended for preservation of the carotene content.

Scoular, Ballew, Carl, and Dozier[4] have found that dehydrated potatoes showed only a 17 per cent. loss in carotene content after storage for one year at room temperature.

B-VITAMINS

The niacin value of cooked fresh tomatoes of good quality was found by Clark[1] to decrease during the first few minutes of cooking, with increases thereafter up to about 30 minutes of cooking, after which there was little further change. When the tomatoes were of poor initial quality, they followed the same general trend as those mentioned above, except that they never recovered their initial value, as did the former.

The riboflavin value of fresh tomatoes experienced an initial slight drop, according to Clark[1], with subsequent increases in the direction of the initial value up to two hours, with decided decreases from two to four hours of cooking.

In fresh tomatoes, Clark[1] found that the thiamin content of fresh tomatoes decreased gradually up to one hour, but increased after that time to a point which approached (in the case of tomatoes of poorer initial value), and reached (in the case of tomatoes of good initial quality) the initial value upon cooking from two to four hours.

Fellers[5] has reported that asparagus, peas, lima beans, and spinach retained 78, 97, 46, and 94 per cent. of their thiamin, and 95, 100, 84, and 91 per cent. of their riboflavin content, respectively, when quick frozen; and 72, 60, 28, and 71 per cent. of thiamin, and 98, 100, 70, and 45 per cent. of riboflavin, respectively, when canned. Farrell and Fellers reported that dehydrated beans lost little of their riboflavin and thiamin content upon storage.

ASCORBIC ACID (VITAMIN C)

The evidence is considerable that dehydration causes considerable losses in vitamin C (ascorbic acid) content. Hence, it is not advisable to conserve fruits or vegetables intended primarily for their vitamin C value by this method. Canning by the methods recommended in this series of articles will not reduce the vitamin C content of fruits or vegetables seriously. In devising canning procedures, investigators are obliged to take two antagonistic objectives into consideration. First, the processing temperatures and times must be such as to prevent spoilage; and second, they must not be so severe or prolonged as to reduce the nutrient content of the food being processed. This is particularly pertinent in the case of ascorbic acid, which is the most destructible of the vitamins now recognized.

Prolonged cooking (beyond 10 minutes in some cases) will destroy a considerable portion of the vitamin C content of many fresh or canned fruits and vegetables, and hence the shortest cooking time possible, either of fresh or canned vegetables upon which dependence for vitamin C content is based, is desirable.

In summary, it should be said that canning by the recommended processes will conserve the nutrient value of fruits and vegetables

to as great an extent as is compatible with the prevention of spoilage, in the light of our present knowledge.

The ascorbic acid content of fruits and vegetables is the most destructible of any of the vitamins, although fruits and vegetables high in this vitamin will still remain an excellent source of this nutrient after proper canning. Cooking of fresh or canned fruits and vegetables should be of the shortest possible time for conservation of vitamin C, although it is not necessary to eat food raw in order to obtain satisfactory quantities of this vitamin.

Carotene (pro-vitamin A) is not destroyed in cooking or canning and may even be increased in moderate cooking times. The B-vitamins, likewise, tend to undergo only slight losses or none at all during canning or cooking for medium periods of time.

Dehydration appears from various investigations to be a satisfactory method of preservation except when vitamin C is the sole or chief nutrient concerned.

Water-soluble vitamins and minerals will tend to become dissolved in the cooking or canning solutions. Canning solutions should never be discarded.

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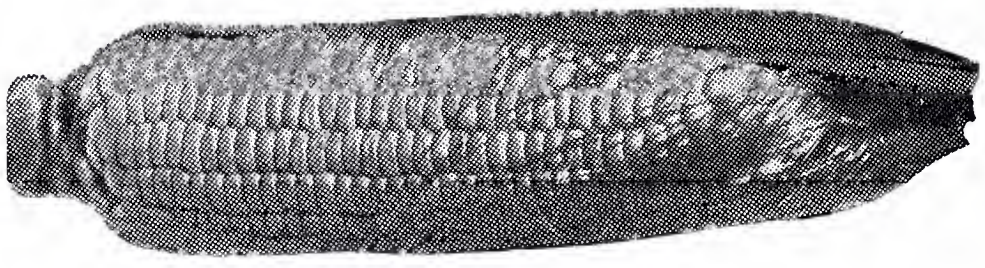


CONSERVE BY USING FRUITS AND VEGETABLES, BOTH FRESH AND PRESERVED, WHICH WERE PRODUCED NEAR BY

Some fruits and vegetables, such as winter apples and potatoes, are fairly staple and may be shipped a long distance or stored a considerable period without losing quality. Others, however, change very rapidly, especially if the weather is warm, and require refrigeration for even short periods of storage or shipment. Because both shipping and refrigerating facilities are required for war purposes or are restricted in other ways, obviously use of horticultural products near the place where they are grown should be practiced and promoted.

To use locally grown products to best advantage, one should become acquainted with the seasons during which produce is abundant or available from nearby sources.

For Pennsylvania and much of the Middle Atlantic and New England states, seasons during which locally produced fruits and vegetables are on the markets, either fresh or from storage, are those shown in the tables below. Where varieties differ in season, these are listed separately.

TABLE XVI

APPROXIMATE SEASONS WHEN LOCAL FRUITS ARE AVAILABLE IN THE NORTHEAST

Kind of Fruit	Best Use	Main Season of Fresh Product	Main Season of Stored Product
Apple, early summer Yellow Transparent Red Astrachan, Duchess	Sauce, pies	July-August	
Williams, Starr	Eating raw	August	
Apple, late summer Maiden Blush Chenango	Sauce, pies	August-September	
Summer Rambo	Baking, sauce, eating raw	September	October
Wealthy	Eating raw, pies	September	October
Apple, fall McIntosh Jonathan Grimes Golden	Eating raw, cooking, pies, baking	September	October-January
Apple, winter Delicious	Eating raw, pies	xx	October-February
Stayman	All uses	xx	November-March

xx Ripened in storage

TABLE XVI (continued)

APPROXIMATE SEASONS WHEN LOCAL FRUITS ARE AVAILABLE IN NORTHEAST

Kind of Fruit	Best Use	Main Season of Fresh Product	Main Season of Stored Product
Baldwin	All uses	xx	November-March
York	Pies, cooking	xx	December - March
Rome	Pies, baking	xx	December-March
Winesap, Black Twig	Pies, cooking	xx	December-April
Gano, Ben Davis	Pies, baking	xx	February-May
Berries Blackberries Boysenberries Dewberries	Eating raw, pies, juice, jam, canning	July, August	
Blueberries Huckleberries	Eating raw, pies, canning, juice, jam	July, August	
Raspberries	Eating raw, canning, pies, juice, jam	July	
Cherries Sour	Eating raw, canning, freezing, pies, cooking	June - July	
Sweet	Pies, cooking, canning, eating raw	June - July	
Currants	Jam, jelly, juice, canning	July	
Gooseberries	Preserves, pies, jelly, canning	July	
Grapes	Eating raw, jam, jelly, juice, conserves	September-October	November
Peaches Early varieties	Slicing, stewing, pies	July - August	
Midseason varieties Belle, Hiley, Champion, Hale	Slicing, stewing, canning, freezing, pies	August, early September	
Elberta	Stewing, pies, canning	Late August, September	
Pears, summer Bartlett, Clapp	Eating raw, stewing, canning	August	
Pears, fall Kieffer	Stewing, canning	xx	September-October

TABLE XVI (continued)
APPROXIMATE SEASONS WHEN LOCAL FRUITS ARE AVAILABLE IN NORTHEAST

Kind of Fruit	Best Use	Main Season of Fresh Product	Main Season of Stored Product
Sheldon, Anjou, Bosc, Duchess	Eating raw, stewing	xx	October-January
Seckel	Eating raw, spicing, preserving	September	October
Plums	Stewing	July-August	
Early (early June, Burbank)			
Midseason (Prunes, Bradshaw, Green Gage, Pond, Archduke)	Eating raw, cooking, drying, canning	August-September	
Late Damson	Preserving, jam, jelly	September	October
Strawberries	Eating raw, freezing, preserving, canning	June - July	

APPROXIMATE SEASONS WHEN LOCAL VEGETABLES ARE AVAILABLE IN THE NORTHEAST

Kind of Vegetable	Best Use	Season of Fresh Product	Season of Stored Product
Asparagus	Cooking, canning, freezing	May - June	
Bean, snap	Cooking, canning, freezing	July to frost	
Bean, lima	Cooking, freezing, canning	August to frost	
Bean, green shell	Cooking, canning	June to November	December-March
Broccoli	Cooking, freezing	June to November	
Brussels Sprouts	Cooking	October to November	December-January
Cabbage	All uses except freezing	June to November	December-February
Cabbage, Chinese	Salad, cooking	September-November	December
Carrot	Cooking, eating raw, canning	June-November	December-March
Cauliflower	Cooking, freezing, pickling, canning	June, September to November	December
Celery	Eating raw, stewing	August to November	December-March

TABLE XVI (continued)

APPROXIMATE SEASONS WHEN LOCAL VEGETABLES ARE AVAILABLE IN THE NORTHEAST

Kind of Vegetable	Best Use	Season of Fresh Product	Season of Stored Product
Corn, sweet	Cooking, freezing, canning, drying	July to frost	
Cucumbers	Pickling, slicing	July to frost	
Eggplant	Cooking	August to frost	
Greens	Cooking, salads, canning, freezing	May to November	
Lettuce	Salads	May to November	
Mushrooms	Cooking, canning, drying	November to April	
Muskmelon	Eating raw	August to frost	
Onion, green	Eating raw	May - June	
Onion, bulb	Eating raw, stewing, frying, pickling	July-August	September-April
Pea	Cooking, canning, freezing	June	
Parsnip	Stewing, frying	October-November	December-April
Pumpkin	Baking, pies, canning	August to frost	October-March
Radish	Eating raw, (Winter varieties may be cooked)	May to November	Winter varieties December to March
Rhubarb	Stewing, canning	May to June	
Rutabaga	Stewing	October	November to April
Squash, summer	Stewing	July to frost	
Squash, winter	Stewing, baking, pies, canning, freezing	September to frost	October to March
Tomato	All uses except freezing	July to frost	
Turnip	Stewing, eating raw	May, June, October	November to March
Watermelon	Eating raw, preserving rind	August, September	

ORGANIZING, EQUIPPING, AND OPERATING A COMMUNITY CANNING CENTER

GENERAL CONSIDERATIONS

In certain sections of the country, particularly in the South, community canning and food preserving centers have been in successful operation for greater or lesser periods, and the experiences of these centers not only have shown their advantages in handling seasonal surpluses of perishable foods and in insuring a well-balanced, year-round food supply, but also have brought forth the principles of successful organization and operation.

It seems desirable to promote community food preservation centers as a war service to civilians in other parts of the United States, to insure an adequate supply of healthful foods for individual families and also to provide for certain public uses such as school lunches, hospital dietaries, and emergency food stores, as well as to dispose to good advantage of locally surplus fruits and vegetables. Regions in which such centers are specially needed are suburban areas in which families are lacking in canning equipment and in which Victory gardens are well developed; in rural sections in which many truck or market garden crops are grown for fresh market, and where surpluses are likely to occur; and near wholesale, farm, and retail market districts in cities, to take care of the frequent gluts which occur there. In localities in which fruits or vegetables are grown for commercial processors, however, no need for such centers is apparent.

In community food preservation centers, the canning phase offers advantages over others as the first to be developed. Equipment for this type of preservation is relatively more extensively available than that for refrigerated storage or for quick-freezing, and canned products are more attractive in general than are dried ones. Storages, however, and equipment for drying, pickling, and krauting may be added as each is needed or appears useful to increase the capacity of the center.

Organizing the Community for a Food Conservation Center

In an earlier section of this publication (on page 41), the organization of a Victory Garden Sub-committee on Food Conservation was described. This sub-committee in a locality may well function as the community committee in organizing and operating a food preservation center, or it may simply promote the formation of such a committee as one of its activities. In either event, the community Food

Preservation Center Committee must be the local group which assumes responsibility for all phases of the program of this center.

Information on Community Food Preservation Programs

Much of the discussion which follows is based on information gained at the National Workshop Training Conference of the War Food Administration, Food Distribution Administration held at Peoria, Illinois, from January 17 to 28, 1944; from **Community Food Preservation Centers,** Miscellaneous Publication No. 472 of the Bureau of Home Economics, U. S. Department of Agriculture, October 1941; from **Community Food Preservation Centers, Canning Phase,** a mimeographed publication of the War Food Administration, Office of Distribution, Washington, D. C., January 1944, revised in April, 1944, as Miscellaneous Publication No. 554 of the same agency, entitled **Community Canning Centers;** and from **Establishing, Operating, and Using School Community Canning Plants,** Special Bulletin Number 11 of the State Board of Vocational Education, Atlanta, Georgia, in cooperation with the University of Georgia, Athens, Georgia, April 1943. Those who propose to organize committees and to set up and operate a community food preservation center are urged to obtain copies of the publications, as well as the **Handbook of Community Food Preservation,** from the U. S. Bureau of Human Nutrition and Home Economics, Washington, D. C.

First Steps in Setting Up a Center

The committee, composed of persons who are interested in setting up a center, under a chairman with executive ability and the needed time at his disposal, should determine first the extent of interest in the project; the number of families who would become patrons of the center; and the probable supplies of foods which might be readily available for preservation. Other information which should be obtained is the quantity of canning equipment which may be obtained locally, either by purchase, donation, or loan; possible locations for the center, and building space which might be suitable; sources of financial support, particularly during the setting up of the center; persons qualified to supervise or manage the center; and public and institutional needs which might be supplied by the center as well as the support for the project which public agencies are prepared to lend.

If this preliminary information indicates that a center is needed and would receive sufficient popular support, a public meeting should be called, at which the permanent or working committee is selected.

The permanent committee should, whenever possible, include a business man, a trained home economist, a vocational agriculture teacher, an engineer or a steam or gas fitter, a health officer or physician, a newspaperman, and representatives of garden clubs, civic and service organizations, school board, and local government. The chairman preferably should be a housewife or a gardener with ability for leadership, rather than a professional home economist or educator.

Arrangements and a plan for financing the center must be determined early in the development of a center. Popular subscriptions, sale of bonds, entertainments or dinners, or the organization of a nonprofit co-operative with sale of shares to members or assessments from them are methods of initial financing which may be considered, in addition to grants from councils of defense, utilities, and the like.

In Pennsylvania, for various reasons it seems advisable that community food preservation centers be organized as nonprofit co-operative associations, in which the cost of equipment and supervision, other than the part of it assumed by the State and Local Council of Defense, is prorated among the patron members, and the other overhead and operating costs are assessed at a rate per can necessary to meet these costs. The patrons should prepare, pack, and process their own foods, and should operate equipment themselves; a competent supervisor should instruct patrons in the proper procedures but should not perform any of the operations himself.

One of the first actions which the committee should take is to obtain a paid canning supervisor, who is qualified to manage the operations of the center and to instruct patrons in the use of equipment and in the proper methods of preparing and processing the various foods. In consultation with this supervisor, a suitable location and building are selected, lists are made of equipment to be obtained, floor layout and arrangement are planned, and the probable costs are estimated.

If the center is to provide foods for school lunches, institutions, and similar public uses, either or both of two methods may be followed. Donated raw products may be canned at specified times by volunteer workers, or a toll may be exacted of foods canned by patrons for their own use. The rate of toll will vary with the value of the particular foods per can and with operating costs.

The committee can effectuate worth-while savings by purchasing supplies, cans or jars, and fuel, and providing these at cost (including overhead) to patrons.

The Supervisor or a volunteer worker trained by him should be present in the canning center at all times when it is in operation. His foremost responsibility is to see to it that all patrons and volunteer workers are taught to perform all operations and to follow all processes properly; that proper sanitary observances are followed; that the work is carried forward in an orderly, efficient manner; that

equipment is in good repair and working order; that appointments are made for patrons; and that needed supplies are determined and ordered. While the center is being set up, he should, in co-operation with the committee, decide upon floor plans and layout and should supervise the installation of equipment.

Qualified supervisors should have recent, adequate training in processing methods, or have recent, successful, practical experience in commercial, institutional, or community processing. It is desirable that a state training program for community canning supervisors be arranged as often as needed, preferably annually.

Deciding Upon the Size of the Community Canning Center

The size of the cannery obviously depends upon the number of patrons to be served daily, the quantity of food required by the families for good nutrition, and the quantities of raw products available for different methods of preservation. Authorities of the Food Distribution Administration state that, for canneries with daily capacities up to 500-800 quarts, small retorts, pressure cookers, exhaust boxes, and open kettles heated with gas burners are adequate; for daily capacities from 800 to 1000 quarts and upwards, small- or medium-sized commercial type retorts and other equipment operated with steam from a high-pressure boiler are required for efficient operation.

Because high-pressure boilers and the operators required to fire them present special difficulties during war times, attention in this publication is confined to the smaller centers which may be operated with gas burners or other unit burners.

Setting Up the Community Canning Center

The Building and Its Location. The building in which the community cannery is located should be centrally located with respect to its patrons and should have sufficient space near it for parking cars and for approaching it with trucks in which supplies and foods are brought to it. The cannery preferably should be on a floor level with the ground or slightly above it, for convenience in unloading supplies and raw materials and in loading finished products. The floor should be of concrete or other waterproof composition, provided if possible with floor drains and gutters suitably located. A large door opening upon an outside platform directly from the cannery is very desirable.

Running, drinkable water is an absolute requirement; in addition, electric service both for lighting and for operating motorized equipment, gas for fuel in small centers, and telephone service for making appointments or announcing schedules should be provided. The building should be well lighted, and liberal cross-ventilation will reduce considerably the discomfort which might occur without it in hot

weather, when much of the year's canning is done. A relatively high ceiling also makes it possible to control temperature more comfortably, especially if there is a story above it.

Sewage disposal should be provided either to town sewers or to a septic tank. Toilets and lavatories should be properly segregated from the canning room.

Walls should be of materials which can be cleaned and preferably are painted a light color.

Kitchens in church basements, lodge or grange halls, or other semiprivate locations often are satisfactory for small centers. School kitchens may be well equipped for small canning operations but usually become unavailable for the use of cannery patrons during the early fall months, when most of the canning is to be done. If the canning center seems likely to expand, sufficient space should be in prospect when the project is started.

All doors and windows which are to be opened should be screened.

Equipment Needed, according to the Food Distribution Administration, for a community canning center processing from 500 to 800 quarts a day, is shown in the list below. For lists of equipment required for larger centers, inquire of the Food Distribution Administration, Washington, D. C.

Item	Description	Number Required
Retort	No. 2, capacity 24 quart jars or 33 No. 3 tin cans	1
Pressure cooker	Capacity 10-14 quart jars or 14-18 No. 3 cans	6
Inset crate	Extra for No. 2 retort	1
Open kettle or process tank	Size to fit No. 2 retort inset crate	1
Can sealer	Bench type, hand operated, capacity 3-4 cans per minute	3
Exhaust box	3 by 4-ft. batch type, heated with gas burner or stove	1
Wash tank	2 by $2\frac{1}{2}$-ft., 2-ft. deep or double compartment sink	2 or 3
Scalding tank	26-inch diameter, 36-inch depth	1
Blanch tank	Same as above	1
Cold dip tank	Same as above	1
Can washing tank	2 by 3 ft., 1 ft. deep	1
Cooling tank	$2\frac{1}{2}$ by 3 ft., 3 ft. deep	1
Preparation table	3 by 10 ft., 34 in. high	2

Fill table	3 by 6 ft., 34 in. high	1
Blanch basket		5
Can trays	Capacity 18 qt. jars	24
Cutting boards	1 by 2 ft., hardwood	12
Dish pans	12 qt. capacity	24
Dollies		1
Thermometer	Canning	2
Gauge tester	For testing pressure gauge	1
Gloves	Neoprene or steam-proof leather	
	for women	6 pr.
	for men	6 pr.
Garbage cans	20-gallon capacity with covers	4
Galvanized buckets		5
Water hose	15-20 ft. length	1
Tongs	For lifting hot glass jars	3
Mill file	10-inch	1

In addition, equipment should include first-aid kit, fire extinguishers, marking equipment, repair parts for equipment and tools for repairing (such as asbestos fibre gasket for retort), large food mill or hand-operated sieve, pulper, can opener, and funnels for filling glass jars if these are to be handled.

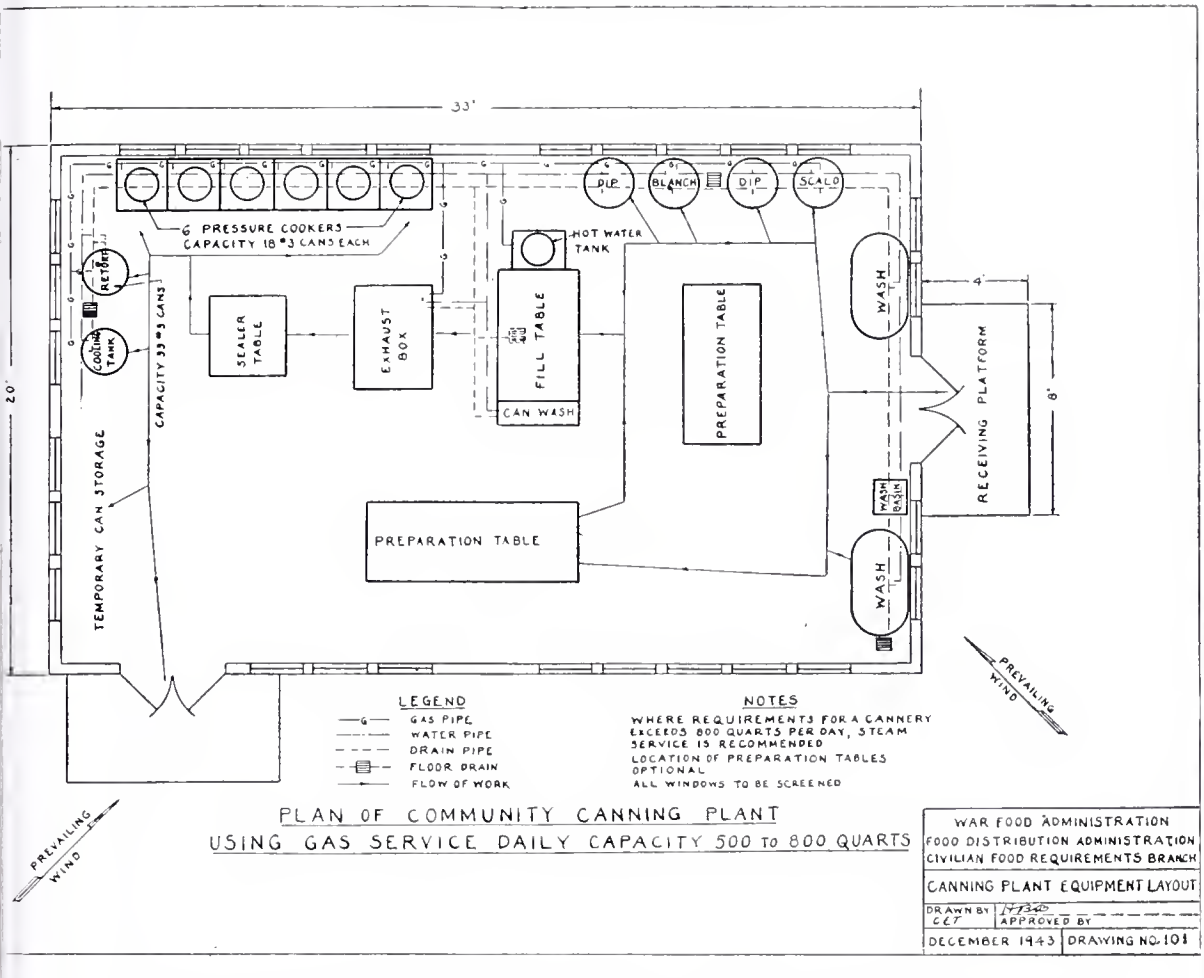
Knives and spoons should be provided by patrons for their own use, though the center may supply them at cost.

Equipment in the foregoing list which is needed only for handling tin cans may be omitted if the center is to operate with glass jars only.

The choice as to whether to can in glass jars or tin cans may be decided on the advantages and disadvantages of each. Advantages of glass jars are that they are everywhere available, they are cheap when repeated use is considered, and many home canners are familiar with their use. Products make a good appearance and need not be labeled for identification. Properly processed foods will keep indefinitely, without danger of reacting with the container or rusting through.

Disadvantages of glass jars are that they are fragile, they can not be sealed so as to withstand sudden changes of pressure, they may crack with sudden changes of temperature, they require longer time to process, and they can not be cooled rapidly in water. Their chief disadvantage in a community cannery is that they retard operations considerably.

Most of the advantages and disadvantages of tin cans may be deduced from the preceding two paragraphs. Their chief advantage is that they make it possible to introduce mass-production methods into the cannery, and they help to reduce the losses of nutrients, particularly vitamins, in canning by reducing the time during which the



products contained remain hot. Furthermore, processes for tin cans have been studied very extensively in research laboratories connected with the commercial canning industry and are somewhat more reliable, from the standpoint both of avoiding spoilage and of reducing nutrient losses.

Floor plans for placing equipment, tables, etc., must be adapted to the size and shape of the room which is available, unless a room can be designed specially for the community cannery. Equipment should be located so that a good flow of products will result through the various steps in receiving, washing, preparation, blanching, scalding, cooling, peeling, preheating, filling, closing, labeling, processing, cooking, and delivery to patron.

A drawing is presented herewith, of an ideal floor plan for a community cannery with a capacity from 500 to 800 quarts a day, using gas-heated unit equipment, prepared by the Civilian Food Requirements Branch of the Food Distribution Administration. The arrows in the drawing indicate the line of flow of produce requiring the different types of preparation and processing.

For a cannery in a particular room, a plan should be drawn to scale, and, with reference to the different foods and the different ways in which they will be prepared and processed, different possible locations of equipment should be studied, and the one which promises greatest efficiency should be adopted.

It should be remembered, however, that paths of flow are not the only consideration; space for the maximum number of persons who will be working in the cannery at one time also must be taken into account. If serious crowding occurs, great losses in the efficiency of the center will result.

Tables of course may be moved about, if experience shows that better arrangements may be made; scalding tanks, exhaust boxes, blanching tanks, cooling tanks, and retorts which are connected either to water lines, drains, or gas supply lines are difficult to move, and utmost care should be exercised to locate them properly at first.

Equipment

Canning Retorts. As received from the manufacturer, the No.2 retorts with a capacity of 24 quart glass jars or 33 No. 3 cans carry the following:

1 pressure gauge
1 brass petcock
1 pressure release valve
1 $\frac{3}{4}$-inch plug
1 $\frac{1}{2}$-inch plug
1 metal basket, perforated
1 cast metal ring, to support metal basket
1 large machine bolt and nut
1 section of galvanized steel pipe
1 cast steel crane arm
1 cast steel wheel
1 short metal rod, threaded at both ends

The last five items listed are parts of an assembly for lifting and swinging to one side the cover of the retort during filling or emptying of a charge. They are put together as follows: the large bolt is inserted downward through the higher collar at one end of the crane arm, with the convex curve of the arm uppermost, and then through the piece of galvanized pipe. Next the bolt with these two parts on it is inserted into the metal bracket on the side of the retort, and the nut is screwed upon the bottom end of the bolt. This secures the crane arm in the proper position, so that it may be swung over the top of the retort.

Next, the threaded rod is screwed into the tap at the center of the retort cover, through the collar of the crane arm; the shorter threaded end is the one thus inserted. A Stillson or pipe wrench should be used to turn the rod firmly into the retort cover. The wheel now can

be turned upon the upper end of the threaded rod, to lift the cover as required.

The cover should be placed on the retort always in the same position. To assure this, a vertical mark may be filed in the edge of the cover, to correspond exactly with a second vertical mark filed lightly on the outer surface of the top of the retort. If the rim of the retort is not smooth and properly curved it should be filed or ground smooth and hammered to the proper curvature to fit the groove in the cover; otherwise the gasket of the cover will be worn too rapidly. For covers with asbestos fiber gaskets, or with worn out lead gaskets, extra fiber gasket material should be kept on hand, and inserted after the worn-out gasket is removed. A sharp knife, a screwdriver or narrow cold chisel, a hammer, and a small block of wood for hammering the new gasket into the groove in a flat position are all the tools required.

The pressure gauge, pressure release valve, and petcock are screwed tightly into the three taps in the retort cover. Lead paint or pipe sealing compound should be applied to each before it is screwed into its respective tap, to insure a tight seal. If these accessories are difficult to thread into place, a plumber should clear the threads with a tap of the proper size.

If the retort is to be used as a pressure cooker, the two metal plugs are screwed tightly with pipe-sealing compound or lead paint, into the corresponding taps in the bottom of the retort, from the inside.

All of the foregoing operations should preferably be done by a plumber or steam fitter, unless someone experienced in canning operations is numbered among the committee, to avoid damage to the parts and to insure perfectly tight joints which will withstand the pressures required without any leakage. **A plumber or experienced operator also should check the pressure gauge before the retort is used, and from time to time thereafter.**

The retort should be secured in an upright position on the stove or burner, because, though it is stable enough when full, when it is empty or nearly so, the cover is sufficiently heavy to cause the retort to upset when it is swung to one side. A demountable tire rim from the last Chevrolet car wheels with this feature, obtainable from auto junk yards, just fits the retort. This may have three metal legs welded or riveted on, to form a stand. Another device for securing the retort is illustrated in a picture on page 163.

If the retort is to be used with steam from a boiler, a drain connection is made through the larger tap in the bottom, and both steam and water connections through the smaller. The latter is needed if glass jars are to be processed, because the standard procedure is to process these under water, to avoid cracking of the jars when steam is admitted. It is desirable to insert a thermometer into the retort, and to regulate the process by temperature rather than by pressure. This

may be done rather simply by drilling a one-half inch hole through the cover and then securing an ordinary immersion thermometer into the hole by passing it through a one-hole rubber stopper, inserted tightly into the hole from the inside of the cover.

An extra metal basket, or extras at the rate of one for each two retorts, will increase efficiency in the use of the retorts considerably.

Pressure cookers holding 10 quart glass jars or 14 No. 3 tin cans are the smallest that can be used satisfactorily in community canning kitchens. Their chief use is for processing smaller batches of produce, or quantities already preheated or exhausted which are in excess of the capacity of the retorts. The number of pressure cookers as well as the number of retorts required may be estimated from the number of times each may be filled and emptied per day, and the capacity at each fill, in relation to the total number to be processed daily.

Gas burners for retorts and exhaust boxes should have sufficient capacity to heat the equipment to the desired temperature in about 10 minutes. For the No. 2 retorts, a heating capacity of 30,000 to 150,000 B.T.U.'s per hour is required.

Open process tanks or kettles are used for processing acid fruits or vegetables in boiling water. The most desirable size is one holding from 15 to 30 jars at one time. It should be deep enough to permit the water level to be at least one inch above the tops of the jars. A wash boiler with a perforated false bottom or rack is suitable in small centers. The number of open process tanks or kettles required is estimated in the same manner as the number of retorts or pressure cookers.

Cooling tanks are required where tin cans are used, and for products which do not have to be cooled under pressure. The number should be one for every three pressure cookers or open process kettles. A cold water inlet at the bottom and an overflow drain near the top, above the tops of the cans in the basket or tray, should be provided for circulation of cold water.

Can sealers for tin cans should be of sturdy construction. One extra sealer in reserve for each two or three in actual operation is a good provision against delay, if one goes out of repair or adjustment. Adjustments should be checked according to manufacturer's directions.

Exhaust boxes, also for tin cans, are used to heat the contents of the cans and to drive out air, before the cans are sealed and placed under process.

Washing tanks, blanching, scalding, and **cooling tanks** may be of similar size and construction. They should be of sufficient capacity to permit dipping in wire or perforated metal baskets so as to cover the contents, and to permit some movement back and forth of the baskets.

Preparation tables three feet wide should provide a space 30 inches long for each of the patrons at work at any one time. Tops should be

of moisture-proof material which is without cracks or joints in which organisms causing spoilage might lodge.

Pressure gauge tester. A portable, hand-operated gauge tester is useful, but the master gauge on it should be checked against a manometer several times during the season. A homemade pressure gauge tester may be made of steam pipe fittings arranged to permit mounting one's own gauge together with a master gauge on a retort at the same time, so as to permit one to calibrate his own gauge.

Tools needed for adjusting and repairing equipment include two 18-inch pipe wrenches and one each—pipe vise, set of open-end wrenches, set of pipe threading equipment, 6-inch screwdriver, 12-inch screwdriver, hack saw and blades, hammer, saw, and square. An emery wheel or oil stone for sharpening knives, a can opener, and tongs for lifting hot jars should be provided.

Extra parts which should be kept on hand include three wing nuts for each retort or pressure cooker, three eye bolts for each retort, gaskets (two for each pressure cooker and three for each retort), one pressure gauge for each three retorts or 5 cookers, one safety valve for each four retorts or five cookers; one set of seaming rolls and sealer arms for each can sealer, together with adjusting screws, springs, and hand washers or rubberized pads as required for base plates of sealers; valve seats for steam valves and washers for water valves.

Cleaning equipment, including brooms, mops, squeegees, scrub brushes, and cleaning cloths should be kept in a storeroom.

Containers

If tin cans are to be used, they may be obtained in the most convenient sizes, without restrictions or priorities, for preserving food which is not to be sold. Three types of tin cans are obtainable: plain tin for general purposes; C-enamel to prevent discoloration of vegetables such as corn, containing sulphur compounds; and R-enamel for the same purpose with highly colored fruits and vegetables, such as red cherries, beets, and berries. The types recommended for different products are the following, in which the first choice is listed first and the second choice, if any, is second: for apples, snap beans, greens, peaches, pears, plums, and tomatoes, plain tin; for green lima beans, C-enamel and plain; for beets and pumpkin, R-enamel and C-enamel; for berries and cherries, R-enamel; for carrots, C-enamel and plain; for corn, C-enamel; for peas, plain and C-enamel; for sauerkraut, plain and R-enamel.

Obtaining Equipment

Equipment items for processing food which is not to be sold, and which cost less than $50 each, may be purchased without priorities. When items cost more than this, or if priorities are preferred in order

to insure earlier delivery, the priorities may be obtained by application through the Food Distribution Administration office in the state in which the cannery is located. In Pennsylvania, this office is at 600 North Second Street, Harrisburg, Pennsylvania.

A partial list of manufacturers of canning equipment and supplies is given below.

PRESSURE RETORTS

Continental Can Company, Athens, Georgia
J. P. Dowell Company, McKinney, Texas
A. K. Robins Company, Baltimore, Maryland

PRESSURE COOKERS

Burpee Can Sealer Company, Barrington, Illinois
National Aluminum Manufacturing Company, Peoria, Illinois
Wisconsin Aluminum Foundry Company, Manitowoc, Wisconsin
Aluminum Cooking Utensil Company, New Kensington, Pennsylvania
The Pressure Cooker Company, Denver, Colorado
National Pressure Cooker Company, Eau Claire, Wisconsin
Lakeside Aluminum Company, Menomonie, Wisconsin
Advance Aluminum Company, Chicago, Illinois
Legion Utensils Corporation, Fortieth Avenue and Twenty-first Street, Long Island City, New York

OPEN PROCESS TANKS

Bellaire Enamel Company, Bellaire, Ohio
Belmont Stamping and Enameling Company, New Philadelphia, Ohio
Columbian Enameling and Stamping Company, Inc., Terre Haute, Indiana
Federal Enameling and Stamping Company, Pittsburgh, Pennsylvania
Fletcher Enamel Company, Dunbar, West Virginia
Geuder-Paeschke and Frey Company, Milwaukee, Wisconsin
Lisk Manufacturing Company, Ltd., Canandaigua, New York
Moore Enameling and Manufacturing Company, West Lafayette, Ohio
National Enameling and Stamping Company, Granite City, Illinois
Republic Stamping and Enameling Company, Canton, Ohio
United States Stamping Company, Moundsville, West Virginia
The Schwartzbaugh Manufacturing Company, Toledo, Ohio

CAN SEALERS

Max Ams Machine Company, City Line, Bridgeport, Connecticut
Burpee Can Sealer Company, 128 West Liberty Street, Barrington, Illinois
Continental Can Company, Athens, Georgia

National Pressure Cooker Company, Eau Claire, Wisconsin
Wisconsin Aluminum Foundry Company, Inc., Manitowoc, Wisconsin

TIN CANS

American Can Company, New York Central Building, New York, New York
Atlas Can Corporation, 241 Wythe Avenue, Brooklyn, New York
Continental Can Company, Inc., 100 East Forty-second Street, New York, New York
Eagle Can Company, 356 Mystic Avenue, Somerville, Massachusetts
Independent Can Company, Howard and Ostend Streets, Baltimore, Maryland
Heekin Can Company, Sixth and Culvert Streets, Cincinnati, Ohio
Pacific Can Company, 290 Division Street, San Francisco, California
Phillips Can Company, Cambridge, Maryland
Western Can Company, Seventeenth and Rhode Island Streets, San Francisco, California

GAS BURNERS

J. P. Dowell Company, McKinney, Texas
Consult local gas companies for assistance in obtaining proper burners.

NEOPRENE OR STEAM PROOF LEATHER GLOVES

Hood Rubber Company, Watertown, Massachusetts
A. K. Robins and Company, Inc., 111 Concord Street, Baltimore, Maryland
Sprague-Sells Division, Food Machinery Corporation, 101 East Maple Street, Hoopestown, Illinois

CANNERS' THERMOMETERS

Taylor Instrument Company, Rochester, New York
(Requires PD-576 priority)

TOMATO PEELING KNIVES

Smiley Manufacturing Company, Chicago, Illinois
J. P. Dowell Company, McKinney, Texas

FOOD MILL OR PULPER

Foley Manufacturing Company, 30 Second Street, N.E., Minneapolis, Minnesota
Automatic Canning Devices, Chicago, Illinois

CAN OPENER

Edlund Company, Burlington, Vermont

KNIVES

Butchers' supply firms. Ask your local butcher for names and addresses.

PANS, KITCHEN UTENSILS

Hotel and Restaurant supply firms. Ask your nearest hotel or restaurant manager for names and addresses.

Operating the Center

Before a community food preservation center is put into operation and at the beginning of each new canning season, inexperienced patrons should be given a course of instruction in all operations in the center, by the supervisor or by another competent teacher. This is necessary because in a well-managed center each patron herself performs all steps in the preparation and processing of the foods for her family. This instruction may be given to each patron as she appears at a scheduled time to process food at the beginning of the season, but some preliminary instruction of the patrons in a group or in several groups is desirable.

Retorts of the No. 2 size when heated with gas should have a burner of sufficient capacity to build up the required pressure in about 10 minutes. Approximately four inches of water should be present in the bottom of the retort at the beginning of each process.

Pressure gauges should be checked frequently, against either a thermometer or master gauge as described earlier; the master gauge also should be checked against a manometer, which may be found in railroad shops. If a thermometer is used, steam should have been allowed to escape from the retort during heating, and the pressure should be maintained for at least five minutes before the reading is made. The temperature should be 240 degrees Fahrenheit when the pressure is 10 pounds.

Whenever the retort or pressure cooker is used, it should be vented —that is, the petcock should be fully open until steam escapes for a few minutes, and then should be partially open as the pressure is built up, to be sure that no air remains in the cooker. If air were present, the required pressure would not correspond to the temperature required. The foremost consideration, of course, is the proper temperature for processing, which may be attained only if the pressure is created entirely by live steam. Air in the retort reduces the temperature for a given pressure.

The time of process is counted when the proper temperature, indicated by the pressure gauge, is reached, and this temperature must be maintained until the end of the period specified, regardless of the method or rate of cooling subsequent to the process.

Pressure should not be permitted to fluctuate during the processing period, particularly if glass jars are used, because drops in pressure result in expulsion of liquids from the jars, and result in improper processing. Sudden escape of contents from jars clog openings to pressure gauges and safety release valves.

Garbage should be disposed of regularly before fermentation occurs; cans should be scrubbed and if possible steamed daily, and dried with covers off.

Floors should be thoroughly scrubbed, flushed, and mopped dry at least once a day, and should be flushed at meal time or shut-down periods. Walls should be wiped down weekly. Windows should be kept clean, and screens free of dust. Parking areas or roads around the cannery should be oiled, sprinkled, or treated with calcium chloride to keep dust down.

Lavatories should be cleaned and disinfected daily.

Sanitary drinking fountains or paper cups should be provided for patrons. Use of tobacco should not be permitted in the cannery.

Safety precautions should be observed throughout, such as the placing of rubber mats or slatted board walks where patrons walk, to prevent slipping; the placing of guards over chains, sprockets, gears, belts, shafts, or steam lines; the insulation of pull cords or switches on electrical fixtures, and electrical wiring according to underwriters' codes; vents or hoods for gas burners; shallow sand boxes under gasoline stoves or burners when these are used; buckets of sand or foam fire extinguishers if gasoline or gas burners are used. These precautions are in addition to those regarding the use of retorts, power sealers, and other operating equipment.

First-aid cabinets should be kept at convenient locations and should be checked from time to time.

PROCESSES FOR TIN CANS

Table XVII presents recommended exhaust temperatures in the center of the can, at which cans should be sealed and placed in the processing tank or retort, together with the time to process at the specified temperature and the type of can to use.

More detailed information on nonacid foods may be obtained from **Processes for Nonacid Canned Foods in Metal Containers,** Bulletin 26-L, Fifth Edition, National Canners Association Research Laboratory, Washington, D. C.

The methods of preparation for canning in tin differ from those described earlier for glass, chiefly in that fruits and acid vegetables after washing and peeling are filled directly into the cans, and are covered with boiling sirup before exhausting to the temperature shown in the table, then are sealed and processed. Nonacid vegetables are blanched in hot water, dipped momentarily into cold water, filled at once into cans, then are covered with boiling brine, after which they are exhausted to the prescribed temperature, sealed, and processed.

Safety or pressure release valves should be checked every time the retort is filled, to see that the vent is not clogged and that steam may escape if the pressure gauge fails to register properly.

The lid of a pressure cooker or retort never should be opened until the pressure gauge indicates zero and the petcock has been opened. When it is opened, it should be moved so that steam and vapors escape away from the operator.

Open process tanks always should have the wire rack or perforated false bottom in place before glass jars or cans are placed in them. If these come into contact with the bottom, the glass jars may crack, and a higher temperature may be brought about in the containers than in the surrounding water. Water should be hot when jars are placed in the tanks, and time should be counted only when the water is boiling vigorously in the tank.

When tin cans are used, the operation of the can **sealers** should be checked by filing across the seam, and examining for pin-point openings either within the bottom or the top turn of the rolled metal layers. Such an opening near the top indicates that the base plate is too low; near the bottom, that the first operation roll is too loose. Next, the top of the seam is filed through the outer layer of metal (the cover), beginning at the notch filed across the seam, and for a distance of $1\frac{1}{2}$ inches from it, and the cover hook (portion of the cover which is folded down and inward under the turned-down portion of the body of the can) is pressed downward with the file, then upward over the can to show the inner part of the cover hook. If this is finely scalloped along what was the upper margin of this hook, to a depth not to exceed one-third of the height of the inner part, the seal is a proper one.

When equipment is idle, parts that might rust or corrode should be given special attention, and all parts should be cleaned. Pressure gauges, safety valves, petcocks, and thermometers should be removed and stored in a dry place, and surfaces which might rust should be protected with a layer of automobile cup grease, particularly eye bolts and threads of cranes for lifting retort covers.

SAFETY AND SANITATION

All efforts should be made to keep all parts of the cannery clean, and particularly the surfaces which come into contact with food. Food mixers, washing, scalding, dipping, and blanching tanks should be thoroughly washed daily with hot water and allowed to dry with ample ventilation. Hot soapy water should be used to scrub tops of preparation and fill tables. All equipment should be treated at least once a week with BK, White Wyandotte HTH-15, or a similar germicidal compound.

Towels should be washed and bleached daily, preferably away from the cannery.

TABLE XVII
EXHAUST TEMPERATURES AND TIME OF PROCESSING FOODS IN TIN CANS[1]

Food Product	Type of Can	Exhausting Temperature Degrees F.	Time in minutes to process in boiling water, for can sizes,		
			No. 2	No. 2½	No. 3
Acid Foods					
Apple sauce	Plain	190	10	15	15
Berries	R-enamel	170	15	20	20
Cherries	R-enamel	170	15	20	20
Peaches	Plain	160	15	20	20
Pears	Plain	170	15	20	20
Sauerkraut	Plain	145	12	15	15
Tomatoes	Plain	145	45	50	55
			Time in minutes to process at 240° F. (10 lb. pressure)		
Nonacid Foods					
Asparagus	Plain	160	20	25	25
Beans, snap	Plain	160	20	25	25
Beans, lima	C-enamel	160	45	50	50
Beets	R-enamel	160	20	25	25
Carrots	C-enamel	160	20	25	25
Corn, cream style	C-enamel	200	90	..	..
Corn, whole grain	C-enamel	190	50	..	..
Peas	Plain	160	35	40	40
Pumpkin	R-enamel	190	70	95	95

[1] For times in glass see pages 97 to 99.

CANNED FOOD SPOILAGE

Spoilage of canned food results from failure to sterilize the container and its contents during the canning process. Such failure may be due to too large numbers of spoilage organisms present on the product when it is placed in the can, usually from inadequate washing; too low a temperature in the can during the canning process, most frequently in the center, or that part of the can which is hardest to penetrate; too long a time between exhausting the can or filling it with hot material and processing; too slow cooling; or too close packing or storing in places where heat loss is slow, after preliminary cooling.

Spoilage itself may be of several types, among the most commonly occurring of which is **fermentation,** with the formation of gas, brought about by molds and yeasts, identified by off-flavor and odor, and by pressure in the container resulting in bulging of tops, or ends (in tin cans), or even bursting of the container.

Another common type is **flat-souring,** brought about by organisms which thrive at fairly high temperatures such as those during delays between exhausting and processing or in cooking after processing. This results in sour flavor and odor, which are not accompanied by gas formation, and consequently no increased pressure is apparent.

One of the most dangerous types of spoilage is that brought about by the organism of **botulism.** This, fortunately, is not of frequent occurrence, but nevertheless must be guarded against. The bacterium causing this type of spoilage is found fairly commonly in soils, and thus is more likely to be on dirty than on clean products. In certain forms in which it occurs it may withstand boiling for considerable periods; it does not develop either in the presence of air (oxygen) or in an acid material, and hence it is not feared in acid fruits and vegetables, unless their acidity has been decreased by molds, or in foods which have not been sealed hermetically.

In a closed container from which oxygen has been expelled by heating, and in a nonacid medium, the botulism organism produces a most deadly toxin or poison, which, fortunately for our safety, is not difficult to destroy by heating. Boiling a food for 15 minutes is sufficient to render it safe for use. Because there is no off-flavor or odor, such boiling is recommended after removal from the jar, in preparation for serving, for all home-processed nonacid foods, as well as mildly acid fruits in which mold is present.

Another type of spoilage is the development of a caramelized flavor and a brown color during too slow cooling, known among commercial canners as **stack burn** because it comes from stacking filled tin cans before they have cooled.

COMMUNITY FOOD DEHYDRATORS

Many community food preservation centers may wish to install and operate a food dehydrator, to increase the capacity of the center and to provide an inexpensive method of processing certain suitable foods, requiring little storage space and very simple containers. For the information of such centers, the plans are described herewith for constructing a dehydrator with a capacity up to about eight bushels of certain products as harvested, as presented in a bulletin of the Pennsylvania State Council of Defense, Capitol, Harrisburg, entitled *Construction of Home and Community Dehydrators*, and described in greater detail in Bulletin 448 of The Pennsylvania State College School of Agriculture and Experiment Station, entitled *A Community Dehydrater from Non-Critical Materials.*

Materials

FOR WALLS

Stonewall (Ruberoid Company) or other similar asbestos cement plaster board, 3/16 in. thick:

1 pc. 4 by 4 ft. for bottom of rear wall, if gas burner is used.

2 pcs. 7 in. by 8 ft., for side sections of front wall.

Fire-resistant insulation board, such as Insulite, Celotex, or the like, ½ in. thick:

2 pcs. 4 by 8 ft., for rear wall and wall opposite heater.

1 pc. 4 ft. by 52½ in., for upper portion of wall next to heater.

Fireproof insulation board, such as **asbestos board,** or asbestos paper with asbestos cement plaster board:

1 pc. 4 ft. by 31½ in., for portion next to stove or gas burner.

FOR BOTTOM

1 pc. 3/16 in. asbestos cement plaster board, 4 ft. by 4 ft.

FOR TOP

Fire-resistant insulation board:

1 pc. 4 ft. by 32 in., for middle section.

Asbestos cement board:

2 pcs. 4 ft. by 10 in., for hinged sections at sides.

FOR TOP DOOR

Asbestos cement and fire-resistant boards, each:

1 pc. 33½ in. by 24 in.

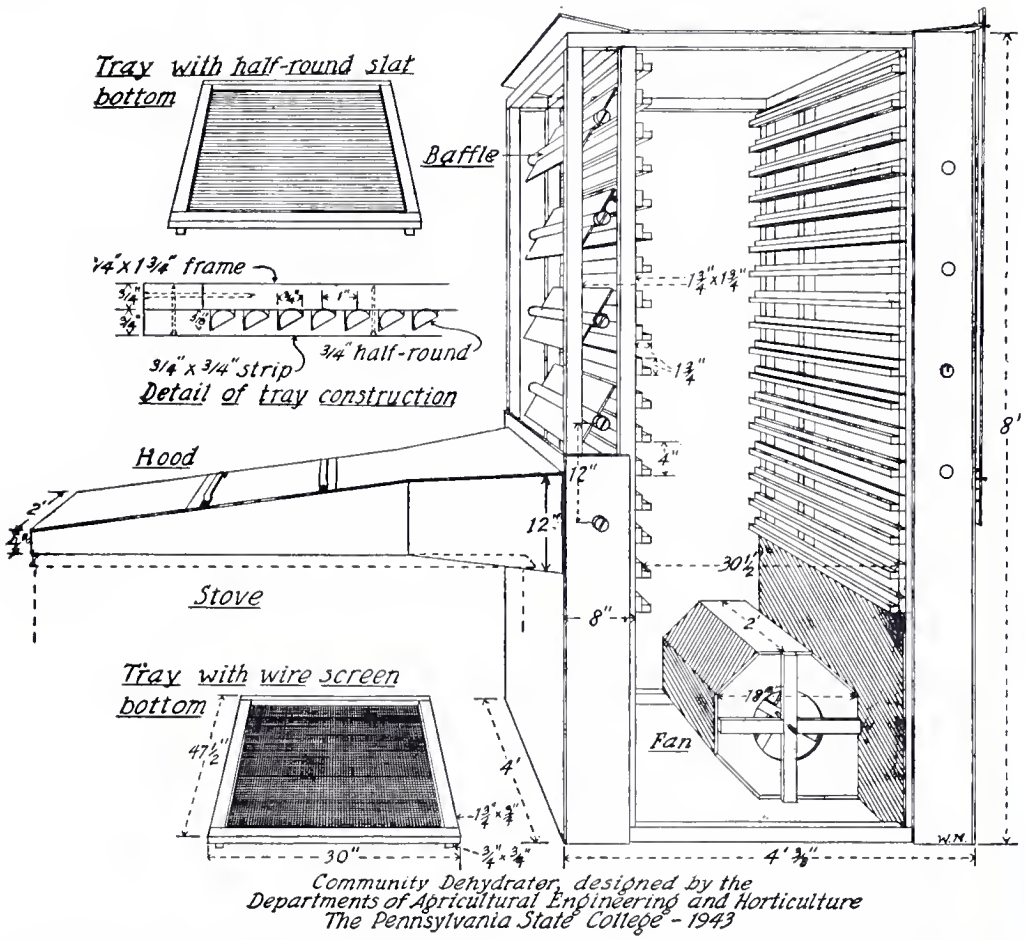
1 pr. cupboard door hinges and 1 cupboard door latch (or wooden button).

FOR MIDDLE DOOR

Asbestos cement **and** fire-resistant boards, each:

1 pc. 33½ by 44 in.

3 cupboard door hinges and 2 cupboard door latches (or wooden buttons).



Community Dehydrator, from "Construction of Home and Community Dehydrators" published June, 1943, by the Victory Garden Committee, Pennsylvania State Council of Defense.

FOR BOTTOM DOOR

Asbestos cement **and** fire-resistant boards, each:

1 pc. $33\frac{1}{2}$ by 28 in.

1 pr. cupboard door hinges and 1 pr. cupboard door latches (or wooden buttons).

FOR FRAME OF CABINET

$1\frac{3}{4}$ by $1\frac{3}{4}$-in. fir wood, clear:

8 pcs. 7 ft. by $8\frac{1}{2}$ in. long.

4 pcs. 4 ft. long.

7 pcs. $44\frac{1}{2}$ in. long.

FOR RAILS TO SUPPORT TRAYS

$\frac{3}{4}$ by $1\frac{3}{4}$-in. fir, clear:

32 pcs. $47\frac{1}{2}$ in. long.

¾ by 1-in. fir, clear:
32 pcs. 47½ in. long.

FOR TRAYS (16)

¾ by 1¾-in. fir, clear:
32 pcs. 44 in. long.
32 pcs. 30 in. long.
¾ by ¾-in. fir, clear:
32 pcs. 47½ in. long.
32 pcs. 26½ in. long.
¼-in. mesh hardware cloth:
16 pcs. 28 by 45½-in., for wire bottoms, or
500 to 700 pcs. of ⅜ by ¾ to 1½-in. fir, clear, for slat bottoms.

FOR FAN

4 pcs. ½ by 5-in. fir, 22 in. long, for blades.
4 pcs. ¾ by 1½-in. oak, 17 in. long, for blade supports or spokes.
4 pcs. ¾ by 9-in. fir, 18 in. long, for cylinder ends.
5 pcs. ¾ by 9-in. fir, 24 in. long, for cylinder walls.
1 pc. ¾ by 14-in. fir, 24 in. long, for cylinder bottom.
4 pcs. ¾ by 1½-in. oak, 19½ in. long, for shaft supports.
1 pc. ¾-in. steel shaft, 42 in. long.
1 pulley, 10-in. diameter.

FOR BAFFLES

10 pcs. asbestos cement board, 4 ft. by 9 in.
20 pcs. ¾ by 1¾-in. fir, 4 ft. 6 in. long.

FOR HOOD (on 2 by 5 ft. range top, with firebox in center).

Asbestos cement board and **fireproof** asbestos board each:
2 pcs. 4 in. wide at one end and 10 in. at other.
1 pc. 4 in. by 2 ft.
2 pcs. 20 in. by 26½ in.
1 pc. 25 in. long, 26½ in. wide at one end, 44½ in. at other, shaped as shown in diagram (end of top next cabinet).

Asbestos cement board:
2 pcs. 9 in. wide and 24 in. long, for heat spreader.
1 pc. 9 in. long, 44½ in. wide at one end and narrowed toward the other end so as to fit the bottom of the hood, at the end next the cabinet.

16 3-in. angle braces of ½ in. strap iron, with 3/16 in. stove bolts.
2 pcs. ⅛ by ¾-in. strap iron, 12 in. long, with a 3/16 in. hole drilled ¾ in. from each end, for handles on removable section over fire box, and 4 stove bolts 3/16 in. by 1 in.
1 pr. small strap or butt hinges for attachment of end of hood farthest from cabinet.

FOR HEAT SPREADER IN HOOD

Asbestos cement board:

2 pcs. 2 ft. long, 9 in. wide at one end and 7 in. wide at other.

2 pcs. 3 in. wide and 17½ in. long.

4 3-in. metal shelf brackets, for attaching wide ends of heat spreader (large pieces above) to ends of smaller pieces, which act as cross braces.

FOR ADJUSTING VENTS AT TOP OF AIR FLUES

2 pcs. ¾ by 1-in. wood, 66 in. long, with holes drilled at suitable intervals near one end.

2 small strap hinges.

FOR ENCLOSING FLUE INTO WHICH AIR CURRENT FROM FAN IS DELIVERED

1 pc. 3/16-in. asbestos cement board, 27½ in. by 48 in. with 13 by 24 in. opening centered on lower edge, to receive fan.

Constructing the Drying Cabinet

The method of construction is illustrated in the accompanying perspective diagram, in which the asbestos cement plaster board or insulating board covering the frame is shown, with a part of this board removed on the front and side of the upper portion of the left-hand air flue, to show the frame construction and arrangement of the baffles in the air flues. The doors, which are hinged on either side of the front opening through which trays are inserted, are not shown.

The walls of insulating board are attached by nailing directly to the 1¾ by 1¾-in. frame members. The asbestos board is nailed directly to the frame, through 3/32-in. holes drilled for this purpose.

The bottom and top members of the frame are constructed first, by nailing the 4-foot pieces to the ends of the 44⅛-in. pieces of 1¾-in. fir by means of 4-in. finishing nails. The top section of the frame has four 44⅛-in. pieces, two of which are nailed at the ends of the 4-ft. pieces, and two others parallel to these and 6¼ in. from them, center to center; the bottom section has three front-to-back (44⅛-in.) pieces, the outer two nailed as on the top section, and the third piece 6¼ in. center to center, from the outer piece on the side on which the fan is located. Next, the bottom and top members are nailed to the respective ends of the vertical 1¾ by 1¾-in. members, which are 7 ft. 8½ in. long. Baffles are made by nailing or bolting ¾ by 1¾ by 54-in. wooden pieces on opposite sides of the 9 x 47-in. asbestos cement board, parallel to the long edges and midway between them with equal lengths of the wooden pieces extending beyond the ends of the asbestos board. These ends are rounded, to insert in 1¾-in. holes in the asbestos board walls as

shown. The front and back wall board pieces are nailed to the upright and cross members of the frame with the baffles in place, and the top and bottom pieces of insulation and cement plaster board, respectively, are nailed to the respective cross members.

Next, the guide rails for trays ($\frac{3}{4}$ by $1\frac{3}{4}$ by $47\frac{1}{2}$-in. wood pieces) are nailed to the inside of the inner upright frame members, and bottom pair with their lower edges $27\frac{1}{2}$ in. from the bottom of the frame, and the succeeding ones 4 in., center to center, each above the other. To these, the supporting rails for trays ($\frac{3}{4}$ by 1 by $47\frac{1}{2}$-in. wood pieces), are nailed, with the $\frac{3}{4}$-in. edge in contact with the guide rails and flush with the lower edge thereof.

The remaining pieces of asbestos cement board and insulation board —the side walls of the cabinet—now are attached.

Construction of Trays

Trays are made by nailing $\frac{3}{4}$ by $1\frac{3}{4}$ by 30 in. wood pieces to ends of $\frac{3}{4}$ by $1\frac{3}{4}$ by 44-in. pieces, so as to make a frame $\frac{3}{4}$ in. deep and 30 by $47\frac{1}{2}$ in. outside dimensions, as shown in the diagram on page 152.

The hardware cloth is secured to the under surface of the frame by tacking with staples and then securing these by nailing the $\frac{3}{4}$ by $\frac{3}{4}$-in. strips along the edges of the hardware cloth flush with the inner margin of the tray frame. The $47\frac{1}{2}$-in. pieces are nailed first, extending across the end members to strengthen the frame.

Tray bottoms for use with fruits or other acid products may be made also of half-round wooden pieces $\frac{3}{4}$ in. in diameter and 28 in. long, which are tacked with their flat sides downward, into a series of slanting notches in two $\frac{3}{4}$ by $\frac{3}{4}$-in. strips $47\frac{1}{2}$ in. long and $27\frac{1}{4}$ in. apart, center to center. The notches are one in. apart, center to center, and are $\frac{3}{4}$ in. wide, $\frac{5}{8}$ in. deep on one side, and $\frac{1}{4}$ in. deep on the other. If the half-round pieces are inserted into these notches with flat surface downward, slanted to fit against the slanting bottoms of the series of notches, the curved upper surfaces of the half-rounds will be even with the upper surface of the $\frac{3}{4}$ by $\frac{3}{4}$-in. strips in which the notches are cut. The slotted tray bottom thus formed is nailed to the under side of the 30 by $47\frac{1}{2}$-in. tray frame, as shown in the detail of an all-wood tray, illustrated in the diagram. The bottoms may be made more simply, by nailing $\frac{3}{8}$ by $\frac{3}{4}$-in. strips crosswise of the tray frames, leaving $\frac{1}{8}$- to $\frac{1}{4}$-in. spaces between them. The cross strips are 28 in. long.

Constructing the Hood for the Heater

The hood must be designed to fit the top of the heating stove used, and preferably should enclose the top of the stove to as great an extent as possible. It may be constructed of asbestos cement board, held together with metal angle braces or straps fastened to the board by

means of stove bolts ½ in. long and 3/16 in. in diameter. The top of the hood should slope upward toward the drying cabinet, at the rate of approximately one inch to the foot. The outer surface of the hood should be covered with fireproof asbestos insulating board or plastered with ground asbestos. Provision should be made for a readily removable section or sections through which fuel may be introduced into the stove and drafts may be regulated.

Radiant heat should not be permitted to pass directly into the drying cabinet. A baffle of nonconducting, noninflammable material should be interposed between the stove and the drying cabinet, so that heat is transmitted into the cabinet by means of hot air currents only. Otherwise, uneven heating with danger of scorching or even of fire may result.

A heat spreader should be introduced into the hood next to the drying cabinet. This may be constructed of two pieces of asbestos cement board (or sheet metal if available), set up on edge so as to form a wedge-shaped divider, with the narrow end away from the drying cabinet. This should not extend entirely to the top of the hood, but about three-fourths of the distance from the top of the stove to the top of the hood. The width of this heat spreader should be about 18 inches at the end of the hood next to the drying cabinet proper.

The end of the hood farthest from the cabinet is hinged at the top, so as to permit adjustment of the air intake.

The hood must be **absolutely fireproof** in construction; asbestos cement board, fastened with metal braces, is acceptable for the hood itself, and insulation must be of **fireproof** asbestos board or of ground asbestos plaster.

A sheet of **fireproof** insulating material should be interposed between the stove and the drying cabinet, below the flue through which hot air is admitted into the drying cabinet. For this purpose, asbestos board should be substituted for the fire-resistant material with which the rest of the cabinet is insulated, on the side of the cabinet next to the stove or other heater.

The Fan

The fan is constructed on the centrifugal principle which was applied in the fanning mill once common on the farm. It consists of a paddle wheel of four blades at right angles to each other, 17½ in. in diameter and 23½ in. long, rotating in a cylinder 18 in. in diameter and 24 in. long, mounted horizontally at the bottom of the drying cabinet, next to the air flue opposite the stove or other heater. The axle may be a steel shaft ¾ in. in diameter and 42 in. long, or, if this is not available, a wooden shaft 2 in. in diameter and two ft. long, with ⅝ in. bolts inserted longitudinally in the ends to reduce friction in the end bearings.

The blades are supported by transverse $\frac{3}{4}$ by $1\frac{1}{2}$-in. pieces of oak or maple, 17 in. long, through which the steel shaft fits tightly at the center. Two such pieces at right angles to each other at each end of the cylinder support the four blades or paddles.

The ends of the cylinder are closed from the circumference inward to the inner edge of the rotating blades, and from there to the center, the opening should be as little obstructed as possible by the members supporting the axle of the fan, because this is the opening through which the air enters the fan.

The fan discharges through a longitudinal opening 9 in. wide and extending the full length of the cylinder. This opening, as indicated in the diagram, is placed next to an opening of the same size in the lower part of the panel which encloses the air flue at the bottom of the right-hand side of the cabinet.

The axle of the fan is extended through the rear wall of the cabinet, far enough to attach a pulley to the outer end. This pulley should be of such a diameter that the fan speed is approximately 400 to 500 revolutions per minute, with the motor used.

A $\frac{1}{4}$-horsepower electric motor with a speed of 1750 r.p.m. and pulley diameter of $2\frac{1}{2}$ in. would require a fan pulley of 9- or 10-in. diameter.

The cylinder wall may be made of sheet metal if this is available; otherwise, the ends are made with one square corner—the one which will be in the lower right-hand position next the air-flue on the right of the cabinet, and the others octagonal, and the sides are made of $\frac{3}{4}$-in. lumber or plywood.

The direction of rotation of the fan in the position shown in the diagram would be counter-clockwise, as viewed from the front of the cabinet.

Operation of the Dehydrator

The drying cabinet described herewith is designed to be operated either as an evaporator, with gravity air circulation, or as a dehydrator, with forced draft from the fan. If the air flow is to be maintained by gravity only, the trays are placed in a slanting position, with the side opposite the heat source one rail higher than the side nearest it; this causes movement of hot air across the trays by permitting the air to rise as it crosses them. No trays are placed on the lower three rails. Baffles in the air flue on the left side of the cabinet are set so as to deflect to the right the column of air rising through this flue. Each successively higher baffle is set a little farther to the right; some adjustment may be necessary to provide more even distribution between the different trays. Baffles in the air flue on the right side of the cabinet are set either vertical or slanting to the right. A 30 by $47\frac{1}{2}$-in. sheet

of plywood or other board is placed above the topmost tray, slanted in the same direction as the trays, if the cabinet is not filled all the way to the top.

The vent at the top of the air flue on the right side of the cabinet is opened as much as necessary to permit the desired flow of air. The more widely this vent is opened, the lower will be the temperature in the cabinet.

If the fan is operated, as is necessary to utilize the entire cabinet and to obtain best efficiency from the point of view of fuel required, the lowermost two baffles in the air flue on the left side are set so as to deflect the incoming hot air downward toward the fan. Baffles on the right side are set to deflect the draft of air rising from the fan through the air flue on the right, inward between the trays. Successively higher baffles are set farther to the left, as necessary to distribute the air draft evenly among the different trays.

The upper three baffles in the left air flue may be set vertically, or sloping downward to the left if some recirculation of air is desired. The vent at the top of the right air flue is closed, and that at the top of the left flue is opened as necessary to bring about the escape of moisture-laden air and to regulate temperature.

When the fan is in use, trays may be sloped upward toward the left side of the cabinet, by placing the left side of the tray one rail higher than the right side.

The cabinet may be heated by hot air from a floor register of a hot-air heating system or of a pipeless furnace. In this case the cabinet would be set immediately over the register, and the hood would not be necessary. If the fan were used, operation would be as described above. If, however, the fan were not used, the lower three trays would be placed so as to slant upward toward the right, the next three to the left, and so on to the topmost tray used. Baffles would be set so as to deflect the rising air successively to the right and to the left, between the sloping groups of trays.

For instructions on the method of preparing different materials for drying, and the proper procedure in drying each, please consult the section (pages 112 and 115-120) on home drying or dehydration of fruits and vegetables.

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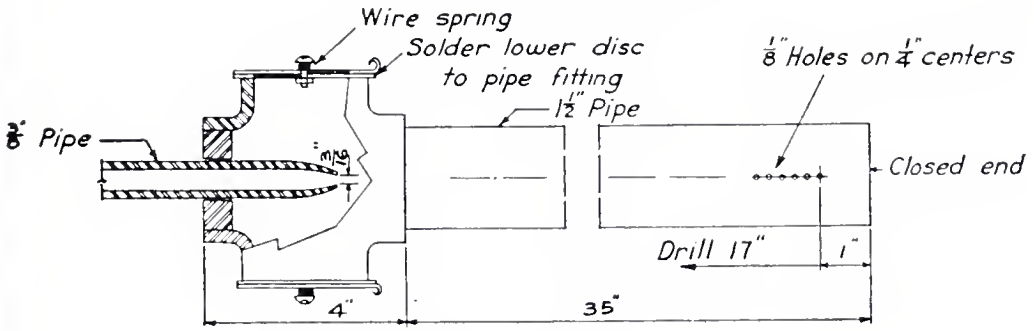
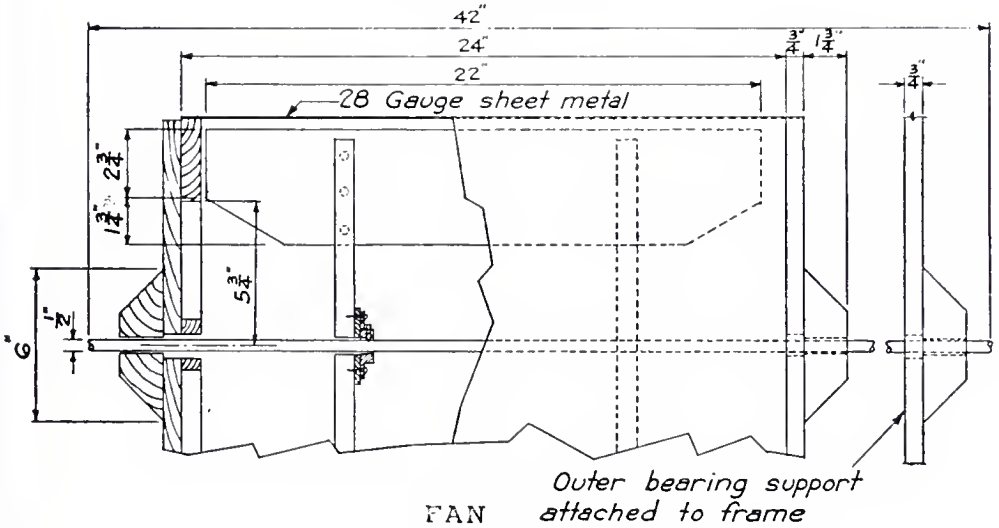


GAS BURNER



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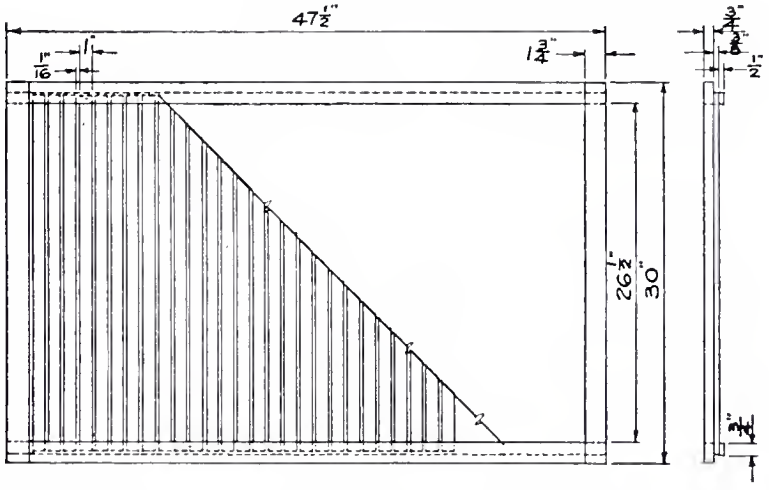

TRAY

Suggestions for gas burner, fan, and tray from "A Community Dehydrater from Non-Critical Materials," by E. W. Schroeder and Conrad B. Link, published September, 1943, by The Pennsylvania State College School of Agriculture, Agricultural Experiment Station, State College, Pennsylvania, Bulletin 448.

A VICTORY FOOD CONSERVATION KITCHEN IN OPERATION

A good idea of a Victory Garden Food Conservation Kitchen's functions can be had by taking a quick visit to Butler, Pennsylvania, typical town in Western Pennsylvania with some industrial and some rural influence. As in Pennsylvania as a whole, the Victory Garden and the Victory Garden preservation activities are under the State Council of Defense.

The Butler Civilian Defense Committee has a special building devoted to its several activities, and here women come together (with sometimes a man or two for good measure) to work on a co-operative basis in canning their Victory Garden produce for home and community use. The Victory Garden Food Conservation Kitchen is well equipped with a Number 2 pressure canner, or retort, loaned by the State Council of Defense, small home-size pressure cookers, and utensils of various kinds, as well as knives for paring and all of the other small tools and articles of equipment needed in a medium-sized kitchen of this type. A canning supervisor, Mrs. Lucille Heasley, is provided by the State Council of Defense during the heavy canning months, and the director of home economics of the local school system, Miss Frances Gerber, lends her aid throughout the season.

A volunteer worker receives all calls, and makes all arrangements for civilian groups to meet together co-operatively to do their own food preservation, and to preserve some in addition for community purposes, such as the school lunch, hospitals, and food banks for community emergencies. This is Mrs. Annabelle Lake of Butler, planning the schedule of activities for the following day.

Custodian of the Council of Defense Building in Butler, Pennsylvania—Mr. T. A. Hite. Some communities, like Butler, have a building, or especial rooms, devoted to the many aspects of civilian defense in wartime. In this building in Butler, nutrition classes are held, first aid is taught, classes in many other aspects of civilian defense are conducted. Here volunteers come together to knit for the armed forces and to can for family and civic purposes. Also, this building is the headquarters for the United States Citizens Service Corps.

Housewives, home economics students—and any other interested civilians—may come together in the kitchen provided for the purpose, to can their Victory Garden produce for home use, and donate surpluses for such civic purposes as the school lunch, local hospitals, and child care centers.

On the following page (top) is pictured the Number 2 Retort installed in the Butler Victory Garden Food Conservation Kitchen operated by the Office of Civilian Defense under the direction of the State Council of Defense. This will enable 24 glass jars or 33 tin quart cans to be processed at the same time. Local talent has provided a mounting frame for the retort which makes its manipulation highly efficient. The retort is provided with a jumbo gas burner which is located at Position A.

In the lower illustration on the next page, a smaller pressure cooker of household size (right) increases the capacity of the Victory Garden Conservation Kitchen.

Members of the home economics class at the high school in Butler, Pennsylvania, aid co-operating civilians in the Council of Defense Victory Garden Conservation Kitchen, by canning surplus garden products for civic purposes.

Above, Number 2 Retort in a specially made mounting frame.

Left, Number 2 Retort and smaller pressure cooker in operation.

Filling the Number 2 pressure canner is a job which requires care. Mrs. Lucille Heasley (left) and Miss Frances Gerber (right) do this with expert skill.

Here are a few of the almost 2000 cans processed by civilians in the Butler, Pennsylvania, Victory Garden Food Conservation Kitchen, under the auspices of a local committee of the Pennsylvania State Council of Defense, in 1943. The work did not get into operation until late in the season because of difficulty in securing equipment. Many times this output is expected in 1944, for home and civic purposes.

CANNING FOR CIVIC PURPOSES

Not only in times of war, but in peace times as well, a survey of almost any town will show that numerous local nonprofit organizations can benefit by contributions of canned foods. At the present time, the Victory Garden sub-committee on food conservation, in many localities, calls upon groups of volunteers to can surpluses in a Victory Garden Food Conservation Kitchen. They avail themselves of government surpluses, if such are available, as is sometimes the case, for hospitals, school lunch, or child care centers.

If federal surpluses are not to be had, donated local surpluses are utilized for civic purposes. Church groups have long done canning for civic purposes using donated surpluses. In such cases, the church vestibule is used as a repository for the donated surpluses, and as a place from which the recipients can collect the canned product.

In 1942 and 1943, Victory Garden Food Conservation Kitchens under the auspices of the War Services, Pennsylvania State Council of Defense, canned hundreds of jars of food for hospitals, orphanages school lunches, child care centers, and emergency food banks.

THE FOOD BANK

A home defense measure in which Victory Garden Committees logically may be expected to assume a leading role is the collection and conservation of stores of nonperishable food materials, or, as they frequently are called, **food banks.** The main purpose of these food banks is to assist each community in supplying its own food needs in case of any unusual demand, such as that occasioned by floods, fire, storms which tie up traffic, air-raids, or any disaster which might deprive certain individuals, families, or communities of their usual food supplies during wartime.

Some counties on a county-wide basis, and some communities on their own initiative, have established such food reserves. Outstanding is the effort in Bucks County, Pennsylvania, where women in Civilian Defense organized community kitchens and filled 23 food banks throughout the county. In Montgomery County two groups co-operating with Victory Gardens planted for the project and canned four tons for a food reserve. In Delaware County two tons were conserved and set aside.

These food banks are an assurance that in such disasters as floods, forest fires, explosions, blizzards, or evacuation of any kind, an emergency food supply would be available in the locality where it was needed without any delays caused by the wartime transportation and communications load.

Under ordinary circumstances, the whole state or nation rallies to the assistance of any locality suffering from such a disaster, but under war conditions this might not be possible, at least in the same degree. With food banks, local emergencies could be met locally, and the nation's energies would be diverted as little as possible from the war effort.

Food banks should be made up of dried, canned, or other nonperishable foods, taken preferably from surpluses produced locally, in order to spare as much as possible the facilities for distribution and transportation of food, now being occupied to the limit with extraordinary war requirements. Home canned or dried fruits, vege-

A Chester County (Pennsylvania) Food Bank, at Kennett Square. Left, Mrs. C. Reinold Noyes; center, Mrs. W. Plunkett; right, Mrs. Russell P. Brewer. Chester County is a reception center should Philadelphia need to be evacuated.

—Photograph by Alfred A. Browne, Philadelphia

tables, and meats, should be featured in local emergency stores, as well as smoked meats and eggs preserved in water glass. Donations of such foods should be solicited during the seasons of local surplus.

Food banks should be housed in places chosen by or known to the councils of defense of the respective communities; they should be suitable for safe storage, out of reach of flood, fire, freezing, or storm. They should be renewed in kind during seasons of local production or surplus; canned and preserved foods not used during the course of one year should be released for the use of local assistance agencies, such as school lunches, hospitals, or charitable organizations or institutions, say at Christmas or other times of feasting.

Food bank procedure should be established by close co-operation of Victory Garden chairmen with Council of Defense chairmen who can co-ordinate with the Red Cross and other agencies, adapting the setup to the needs of the individual county, as well as collecting some food items not produced in gardens and also designating safe depots for storage.

If desired, the canned vegetables in food banks could be replenished yearly as new reserves are made available, and the stock on hand could be distributed to hospitals, etc., throughout the county.

The following are three suggestions for food banks, all based on feeding 100 people for 24 hours.

Victory Garden Food Bank Number 1

100 people—24 hours, to be fed on a canteen basis

Planned by the Vocational Home Economics Teachers of Pennsylvania, through Mrs. Anna G. Green, Chief of Home Economics Education, Department of Public Instruction; submitted by Zitella B. Wertz, head of the Home Economics Department, Altoona High School.

FOOD	QUARTS	STANDARD COMMERCIAL CONTAINERS OTHER THAN QUARTS
Fat for cooking		1 - 3 lb. can
Coffee—1 meal		2 - 1 lb. cans
Cocoa—2 meals		1 - 1 lb. can
		1 - ½ lb. can
Sweetened condensed milk (Sweetener for cocoa)		24 - 13 oz. cans
Evaporated milk (beverage or cocoa)		24 - 13 oz. cans or 3 - 1 gal. cans

FOOD	QUARTS	STANDARD COMMERCIAL CONTAINERS OTHER THAN QUARTS
Grapefruit or juice or	13 - or	8 - No. 5 cans
Applesauce	16 - or	5 - No. 10 cans
Cod fish cakes with		40 - 10 oz. cans
Peas	16 - or	5 - No. 10 cans
Available selection from canned sausage, tongue, beef, meat loaf, chicken, Vienna sausages	12 - or	4 - 6 lb. cans
Spaghetti with tomatoes	16 - or	5 - No. 10 cans
Sweet potatoes	16 - or	5 - No. 10 cans
Green beans	16 - or	5 - No. 10 cans
Peaches or other fruit	16 - or	5 - No. 10 cans
Chili con carne or baked beans	16 - or	5 - No. 10 cans
Hominy with carrots	8	
Gingerbread (baked or fried)		16 - 14 oz. cans
Pears or other fruit	16	

Victory Garden Food Bank Number 2

To feed 100 people for 24 hours on a canteen basis

(Food to be composed largely of canned or dried foods.) Planned by Mrs. Anna de Planter Bowes, Chief, Division of Nutrition, Pennsylvania Department of Health.

Canned or Dried Foods

15 quarts tomato juice
24 cans of evaporated milk (13½ ounce cans)
20 quarts mixed vegetables—canned as a soup mix OR
20 quarts of assorted vegetables as carrots, beans, peas, onions, celery
20 quarts of plums, pears, or berries
25 glasses of apple butter, jam, conserve, or jelly
20 quarts of canned beef or chicken
15 quarts canned tomatoes
20 quarts canned corn or 10 pounds dried corn
20 quarts of peaches, cherries, or apple sauce

Other Foods Which Can Be Stored to Complete Meals

5 pounds skimmed milk powder for soup, Spanish rice, and cocoa
15 pounds rice
1 quart molasses
10 pounds sugar
10 pounds enriched flour for making biscuits or muffins if baking facilities are available

5 pound bag of salt
1 box pepper
1 pound baking powder
2 pounds chocolate syrup or cocoa
2 pounds coffee
1 pound tea
1 large carton (6 pounds) of spice cookies
4 large packages (3 pounds) oatmeal
3 pounds vegetable shortening for short storage period only for communities where bread or rolls might not be available
2 pounds peanut butter for short storage only

MEALS WHICH COULD BE MADE FROM FOOD BANK*

Breakfast

Tomato Juice
Oatmeal or Other Cereal with Milk and Sugar
Biscuits or Muffins with Jam, Jelly, or Conserve
Coffee for Adults with Evaporated Milk and Sugar
Cocoa for Children from Evaporated Milk

Lunch or Noon Meal

Thick Mixed Vegetable Soup with Milk
Muffins or Biscuits
Peanut Butter, Jam, or Conserve
Canned Plums or Pears
Molasses Milk for Children
Spice Cookies
Tea for Adults

Dinner or Evening Meal

Spanish Rice with Canned Beef or Chicken, Canned or Dried Corn
Canned String Beans, Spinach, Chard or other Greens, Muffins or Biscuits
Apple Butter, Fruit Conserve, Jam, or Jelly
Canned Peaches, Cherries, Berries, or Apple Sauce
Molasses Milk or Cocoa for Children
Coffee or Tea for Adults with Evaporated Milk and Sugar

Victory Garden Food Bank Number 3

Suggested Menus for 24 hours on a Canteen Basis
(Sustenance Diet)

Released by Miss Agnes Brumbaugh, in charge of Home Economics Extension Service, The Pennsylvania State College. Submitted by Miss Lydia Tarrant, Nutrition Specialist, Home Economics Extension Service.

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* Every item could be made from food bank if cooking and baking facilities are available. If bread or rolls can be secured from near-by bakeries these would be used in place of making biscuits or muffins.

Breakfast

Tomato Juice†
Hot Cereal (Whole Wheat or Oatmeal) with Sugar and Top Milk
Breadstuff Butter
Cocoa Coffee

Lunch

Vegetable† Soup
Sandwich on Whole Wheat or Enriched Bread (Peanut Butter and Canned Meat)†
Fresh Apples
Milk

Supper

Escalloped Potatoes† with Cheese
Green String Beans† Cole Slaw†
Whole Wheat Bread or Enriched Bread and Butter
Fruit Sauce† Milk Tea

Quantities of foods to be stored in Food Bank for a 24-hour period:

13 quarts tomato juice
25 quarts of canned vegetables to include tomatoes, corn, lima beans, carrots, peas
4 quarts canned meat
3 pounds onions
100 apples
25 pounds potatoes
15 quarts green string beans
15 quarts canned fruit sauce
15 pounds cabbage

ALL VEGETABLES EXCEPT TOMATOES SHOULD BE BOILED 20 MINUTES BEFORE TASTING.

† Food to be stored in bank.

THE VICTORY GARDEN AS A CLASSROOM TOPIC

"If every child were taught from the first grade up what he should eat to be healthy, and how he could raise or obtain such food cheaply, would we have a more robust generation after the war?" asks Eunice Fuller Barnard in **Survey Graphic** for November 1943. "How much could a million obscure teachers do in everyday lessons to bring about that better-fed postwar world of which we talk so much?"

"Perhaps," continued this author, "they could do more than all the statesmen with their grandiose plans, say certain educators from Canada to Puerto Rico who are beginning to think seriously about these questions."

The author then continues to tell the story of how the University of Kentucky's Bureau of School Service has set out to discover whether school lessons in better diet and farming can change the habits of people who have lived and eaten in the same stereotyped way for centuries. Generation after generation on their hilly farms, families in the Kentucky hills have tried, and usually failed, to rear eight and ten children on a day-in and day-out diet of pork, potatoes, corn pone, and coffee. The author tells the rest of the story thus:

"On land which with care could be made to yield vegetables a seed catalogue would envy, they have planted year after year only corn. Even when they attempt kitchen gardens, they seldom can the vegetables for winter use, because there is no place where they can be stored without freezing. There are few cows or chickens. Even goats, which might forage well on the hills, are almost never raised for milk.

"The two- and three-room shacks in which these people live have few more modern conveniences and far fewer comforts than had the log cabins of the Pilgrim Fathers.

"So in the midst of a potential paradise the children who survive grow up with decaying teeth, weak bones, faulty hearts, lungs, and eyes. Too often they are actually ill with pellagra, dysentery, and skin diseases.

"Physically, and sometimes educationally, the one-room schools to which these children go have altered little in the past century. Bleak and solitary, with peeling paint and rotting timbers, they stand, occasionally in the depths of the woods, approached only by footpaths. Inside, seats knocked together from rough lumber cluster either side the stove with its ungainly stovepipe. On shelves at the side may be a stack of miscellaneous, dog-eared books, a water pail, and a tin dipper. Only a war poster or a war activity here and there betokens the 1940's. . . . .

TEACHER-MADE TEXTBOOKS INCLUDE GARDENS

"In such poverty-stricken schools the Kentucky professors, with the help of state and local school, health, and farm authorities, are trying their experiment, aided by a small grant from the Alfred P. Sloan Foundation. First, onto the university campus they brought several of the more ambitious teachers, explaining to them the new plan to make all the school lessons, from the first grade up, center around ways of raising better food on small mountain farms.

"There were no books to go by. So the teachers wrote their own and, with unpracticed hands, even drew the pictures. Agricultural experts at the university supplied the details of farming techniques. Educational experts guided the choice of vocabulary. But the young teachers, under the direction of Dr. Maurice F. Seay, themselves translated all this into story form. They wrote stories about children living and working on farms exactly like those around their schools. As time went on, stories grew into series of little lithoprinted books, with heroes and heroines.

"One series was about the Smith family who, starting from scratch, laid out their farm anew, planted and improved their garden, acquired a goat for milk, raised bees, set out fruit and nut trees, even dug a fish pond, and made sorghum. Finally their farm became so flourishing and their food so good, that many of their products, including the baby, won prizes at the county fair!

"Another series told how a little boy, John, took to chicken raising, how he studied the various breeds of chickens, learned how to build a chicken house, to feed his brood, protect them from pests, and store the eggs. Each series was provided with a teachers' guide, and the Chicken Series even had its special 'glossary.'

"All, of course, were tried out constantly in one-room schools in various parts of several hill counties. Brand new teachers used them in their reading classes. And somehow the books 'caught on.' Slow, stumbling readers doggedly conquered the hard words to follow the farming adventures of the Smith family whose home and clothes and manners were so much like their own.

SOYBEANS AND GOATS IN THE SCHOOLROOM

"Some of the teachers began to get new ideas. They helped the children build and lay out little cardboard farms after the plans in the books. All together, children and teachers planted school gardens, tried out new vegetables the books mentioned, such as soybeans. Sometimes they cooked the vegetable for a hot school lunch in place of the cold biscuits and pork fat packed in lard pails the children were wont to bring from home. A few hardy young creatures even tried canning vegetables on the schoolroom drum stoves.

Two or three teachers, with erratic results and a few violent episodes, kept school goats. Many a room took on a brighter aspect, with fruit and vegetable pictures cut out of seed catalogues, with 'science' corners where children enshrined unfamiliar vegetables along with birds' nests and curious rocks.

"Parents, picking up the books at home, sometimes settled down for an evening's reading. Here was something in their line, and easier to understand than the difficult government farm bulletins occasionally supplied by the county agent. Once in a while a father came to school to see if the teacher could tell him anything more than the books did about getting rid of the mites on hens or building a storage cellar. Or a mother dropped in to get the recipe for the vegetable soup Johnny had enjoyed so much at school.

"Gradually the landscape around certain schools began to show changes. Chicken houses were repaired; new ones were built. Here and there a brand new milk-goat grazed the hills. Vegetables unfamiliar in the region—soybeans, kohlrabi, new kinds of lettuce—began to come up in the fresh-plowed gardens. . . . "

The use of the Victory Garden in Experiment in Applied Economics described above has been discussed in a recent issue of *APECS*. The description follows:

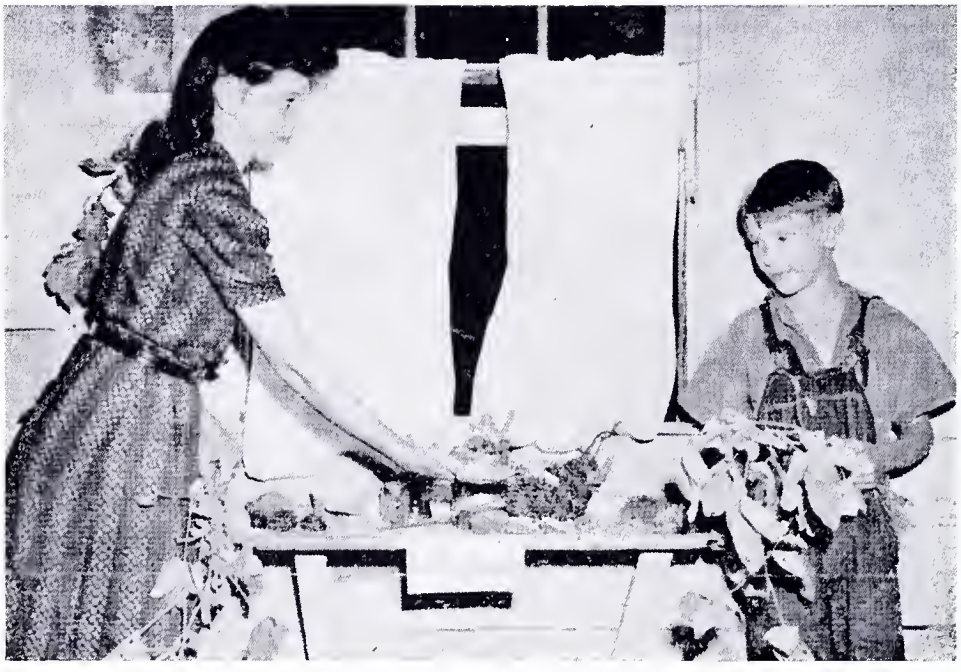

Illustration from Apecs.

Lynchtown, Kentucky, school children study soy beans in an indoor Victory Garden.

"With all the excitement of pioneers, children in a one-room school in the Kentucky mountains are introducing new vegetables into their community. In their fall Victory garden at the Lynchtown school they raised the first soybeans ever grown in that corner of Estill County.

"Parents and friends came to school to see the soybean plot, and the children proudly displayed their first bean vines on the science shelf in their schoolroom. Some of the teachers gave them seeds and plants of other somewhat unfamiliar vegetables such as kohlrabi, celery, and Bibb lettuce. These tasted so good that several families are going to try them in their own kitchen gardens.

"In every bit of the gardening, from turning the soil to gathering the vegetables, the children followed the directions in their school reading books of the two series called *Food From Our Land* and the *Smith Family Series.* Written by teachers in schools like the children's own, the books anticipated almost every gardening problem which the pupils met.

"Under the guidance of their teacher, Miss Lurley Willoughby, the pupils changed the site of their garden from the shady side of the school yard to a sunny, well-drained spot. During dry weather they carried water for their plants. They also built a pole fence to protect the garden from wandering cattle. And when rabbits began to nibble at the soybean plants, the children constructed a rabbit trap like the one pictured and described in their reader, 'Garden Enemies.'

"The garden served also to provide material for reading lessons.

GARDENS NAMED FOR SOLDIERS

"Last spring in McCreary County Miss Gertrude Jenkins, then teacher at the South Mill Creek school, tried another Victory garden experiment. She proposed to the children that they should each help the war effort by planting a Victory garden at home and naming it for some soldier, sailor, or marine whom they knew.

" 'The children were very enthusiastic about the idea,' she said, 'and proudly wrote the names of their gardens on the blackboard.'

"Miss Jenkins explained to the pupils that though they could not send their vegetables to the war fronts, they were helping as much by releasing an equivalent amount of food to the armed forces.

" 'During the summer,' Miss Jenkins reported, 'I saw a number of the children. Each of them had something to tell me about his garden. I believe that each child directly felt his responsibility and worked harder in his garden because the victory for which he was working was no longer vague. He was working to furnish food for a friend or relative in the Service'."

JUNIOR VICTORY GARDEN CONTESTS

The following junior programs, outlined by Professor Owen Friend, Alliance College, Cambridge Springs, Pennsylvania, and revised by Professor Allen L. Baker, State 4-H Club Leader, The Pennsylvania State College, are recommended for promotion by Victory Garden committees among boys and girls who are not 4-H Club or F.F.A. members, the latter having programs under their respective organizations. It is suggested that Victory Garden committees urge local service clubs, public schools, Chambers of Commerce, American Legion Posts, or other community organizations or interested citizens to assume sponsorship for these contests.

Prizes of certificates and War Savings Stamps or Bonds should be offered for all those whose scores are within the groups specified in the outlines below.

Junior Victory Gardeners

1. For school pupils, other than 4-H and F.F.A. members.

Class	Age, Years	Minimum Area
1	10-12 inclusive	750 square feet
2	13-14 inclusive	1000 square feet
3	15-17 inclusive	1500 square feet

Suggested size for town gardens, 500 square feet per person.

2. Use certificates—War Savings Stamps or cash awards.

3.

SCORING PLAN		MANAGEMENT SCORING		
Management (Mid-season home visit)	50	Soil preparation and use of fertilizer		10
*Number, kinds of vegetables grown	20	Planning and planting in proper season	5	
Exhibit (six kinds—See Pennsylvania Agricultural Extension Service Farm Products Show recommendation)	30	spacing	5	
		succession	5	15
		Cultivation—free from weeds		15
		Does Junior Victory Gardener do all or most of the work?		10
	100			50

* Class 1—Perfect Score for 12 kinds of vegetables
Class 2—Perfect Score for 15 kinds of vegetables
Class 3—Perfect Score for 20 kinds of vegetables

4. Give uniform awards to all Junior Victory Gardeners and Canners whose total scores for the season, including **exhibit,** fall within certain limits, as:

1st Merit Award, Scores 90 to 100% inclusive
2nd Merit Award, Scores 80 to 89% inclusive
3rd Merit Award, Scores 70 to 79% inclusive

Junior Victory Canners

1. Class 1—Ages 10-12
   Ten jars to include tomatoes and one other vegetable.
   Class 2—Ages 13-14—25 jars.
   Class 3—Ages 15-17—50 jars.
   Class 2 and 3 requirements to be budgeted as follows: $\frac{1}{3}$ tomatoes, $\frac{1}{4}$ greens. The rest to include at least two other kinds of vegetables or fruits.
2. Same as garden awards
3. Scoring plan

Amount canned	15
Kinds of vegetables or fruits (requirements met)	35
Quality of goods canned	50
	100

4. Give uniform awards to all Junior Victory Gardeners and Canners whose total scores for the season, including **exhibit,** fall within certain limits, as:
   1st Merit Award, Scores 90 to 100% inclusive
   2nd Merit Award, Scores 80 to 89% inclusive
   3rd Merit Award, Scores 70 to 79% inclusive

Note: Among other valuable Victory Garden outlines for elementary school children, Paul R. Young of Cleveland, who has developed a successful program of gardening in the Cleveland Public Schools, has prepared valuable material on this subject, entitled "Elementary Garden Graphs for Boys and Girls." Copies of this material are available to others at nominal cost.

SOILLESS OR CHEMICAL VICTORY GARDENING

Most home production of food, it is admitted, can be brought about to best advantage on fertile garden soil, well exposed to sunlight. Under certain circumstances, however, soilless or chemical culture of vegetables may be carried on to advantage, and certain Victory gardeners who would not have access to a garden plot can indulge in soilless, or hydroponic, gardening with considerable returns, both in satisfaction and in vegetable products.

Soilless, or hydroponic, gardening has been used in hospitals and convalescent homes as a therapeutic measure. This results not only in mental satisfaction to the patient who indulges in this pastime as a hobby, but also in considerable returns in the nature of food.

HISTORY OF SOILLESS GARDENING

A brief history of soilless gardening is contained in a bulletin on **Nutrient Solution Culture of Vegetables and Flowers,** by Warren B. Mack, in Paper Number 938 in the Journal Series of The Pennsylvania State College. This historical review is as follows:

"The present widespread popular interest in nutrient-solution cultures received a strong impulse from the publication in 1936 of an article by W. F. Gericke and J. R. Tavernetti in *Agricultural Engineering*, Volume 17, pages 141 and 142, entitled "Heating of liquid culture media for tomato production." These investigators described an experiment in which tomatoes were grown in tanks 2½ feet wide, 10 feet long, and 8 inches deep, filled with a nutrient solution and covered with wooden frames supporting poultry wire on which excelsior and sawdust were spread. The composition of the culture solution was not specified, but it may be assumed that it was not widely different from others in general use. Temperatures were maintained by means of General Electric heating cables, at 70 to 75 and 80 to 85 degrees F. in different tanks, and best yields were obtained with one variety of tomato, Majestic, at the higher temperature, but with the other, Best of All, at the lower temperature. The maximum yield for a single tank, computed on an acre basis, allowing no space for paths between tanks, was 306.8 tons of tomatoes per acre. Maximum electrical current consumption was 428 kilowatt hours per tank for a period of 5½ months.

"Commercial installations have been made in several greenhouses in California, and one, that of Vetterle and Reinert, at Capitola, California, has been reported to have produced a crop at a cost comparable with that of greenhouse tomatoes by older methods. In one

80x200-foot house, the average electrical current consumption was 30,000 kilowatt-hours per month.

"A deviation from the earlier method of heating by means of electric cables was devised in one establishment, in which the nutrient solution was circulated through a boiler; this method combined a hot-water heating system with the nutrition of the crop.

"Recent commercial developments in nutrient-solution culture, however, are in the substitution of an inert medium, such as gravel, coarse sand, cinders, or similar substance, dampened or periodically flooded with a water solution of nutrient chemical compounds, for soil in greenhouses. The use of tanks containing solutions only has been abandoned in nearly all commercial establishments.

"It is doubtful that the discovery should be credited to one person that plants can be grown without soil, simply by placing their roots in a solution of mineral salts and nitrogen compounds. Water-culture was practiced at least 260 years ago, and probably before that time. Edde Mariotte in 1679 found that plants could be grown in water, and that they required earthly salts, nitre, and ammonia. John Woodward, an English botanist, reported in 1699 that he had grown spearmint, potatoes, and vetch in spring and river water and also in solutions of inorganic salts. Duhamel was the first to grow plants to maturity in water, in 1758.

"This method of plant culture was revived for the purpose of studying the nutrition of plants by Julius von Sachs, a German botanist and plant physiologist who lived from 1832 to 1897. Sachs said in his *Lessons in Plant Physiology*, written in 1882, 'In the year 1860 I published the results of investigations which demonstrated that land plants could obtain their nourishment from water solutions without the help of soil, and that it is possible in this way not only to maintain plants alive and growing for a long time, but to obtain a considerable increase in their organic substance and at the same time to produce viable seeds.' Wilhelm Knop, another German physiologist, and Nobbe also pursued this kind of study, and published an extensive report of experiments in 1868. Knop and Nobbe are noted for having perfected a four-salt solution in which it is possible to grow plants successfully, the so-called Knop's solution, which consists of one part each of potassium nitrate, potassium diphosphate, and magnesium sulfate, and four parts of calcium nitrate, in a 0.1 to 0.5 per cent. solution in water, with a trace of ferric phosphate.

"A modification of the solution-culture method for the study of plant nutrition has been used widely during the present century. This method is the use of washed quartz sand, into which the solutions are introduced just as water would be applied to soil, for the purpose of duplicating more closely the conditions of aeration and

capillarity found in soils. The method was first developed by Hellriegel, a German plant physiologist, in 1888.

"In the second decade of the present century, interest was revived in the use of nutrient solutions for studying the nutrition of plants. In this country, W. E. Tottingham of the University of Wisconsin, J. W. Shive of Rutgers University, S. F. Trelease of Columbia University, and W. F. Gericke, formerly of the University of California, conducted studies on the nutrient-solution culture of plants, and some of the most noteworthy of their studies were carried out in the Laboratory of Plant Physiology of the Johns Hopkins University, under the direction of Dr. Burton E. Livingston, who, in 1918, with a committee of the National Research Council, organized a co-operative study of nutrient solution cultures on a nation-wide basis, to be carried out by colleges, universities, and experiment stations throughout the United States. A great deal of work was done on this project, but little was published about it.

"The commercial production of crop plants by the method of nutrient-solution culture is a development of the past few years. Investigations on the commercial culture of cut-flowers by this method were begun at Rutgers University in 1929, when carnations were grown in sand cultures by Biekart and Connors. Their studies were reported in Bulletin 588 of the New Jersey Agricultural Experiment Station, published in 1935. In this report, it is shown that carnations can be grown in nutrient solutions at a cost comparable with that of soil culture in the greenhouse. Several solutions were used in their experiments, but the most practical one contained 112 grams of ammonium sulfate, 210 grams of monopotassium phosphate, 420 grams of magnesium sulfate, and 1800 grams of calcium nitrate in 185 gallons of tap water.

"Since the present enthusiastic revival of nutrient-solution culture of plants and the accompanying attempts to apply the method to commercial plant and crop production have taken place, publications of scientific as well as commercial interest which have appeared, in addition to those already mentioned, include the following:

Alexander, L. J., Morris, V. H., and Young, H. C. Growing plants in nutrient solution. Ohio Agricultural Experiment Station Special Circular Nc. 56, May, 1939. Wooster.

Arnon, D. I. Microelements in culture solution experiments with higher plants. American Journal of Botany, Vol. 25, pp. 322-325. 1938. University of California, Berkeley.

Arnon, D. I., and Hoagland, D. R. A comparison of water culture and soil as media for crop production. Science, Vol. 89, pp. 512-514. 1939.

Chapman, H. D., and Liebig, G. F., Jr. Adaptation and use of automatically operated sand-culture equipment. Journal of Agricultural Research, Vol. 56, pp. 73-80.

Clark, H. E., and Shive, J. W. The influence of the pH of a culture solution on the assimilation of ammonium and nitrate nitrogen by the tomato plant. Soil Science, Vol. 37, pp. 459-476. 1934. New Jersey Agricultural Experiment Station, New Brunswick.

Crossland, R. W. A physiological study of roses in sand culture and a summary of nutrient solution methods. Rose Annual of National Rose Society. Great Britain, 1939, pp. 169-175.

Davis, A. R., and Hoagland, D. R. An apparatus for the growth of plants in a controlled environment. Plant Physiology, Vol. 3, pp. 277-292. 1928. University of California, Berkeley.

Dunlap, A. A. The sand culture of seedlings and mature plants, Connecticut Agricultural Experiment Station Circular 129. 1939. New Haven.

Eaton, F. M. Automatically operated sand culture equipment. Journal of Agricultural Research, Vol. 53, pp. 433-444. 1936. Bureau of Plant Industry, Washington.

Fisher, P. L. Responses of the tomato in solution cultures with deficiencies and excesses of certain essential elements. Maryland Agricultural Experiment Station Bulletin 375, pp. 283-298. 1935. College Park.

Hibbard, R. P., and Grigsby, B. H. Relation of light, potassium and calcium deficiencies to photosynthesis, protein synthesis, and translocation. Michigan Agricultural Experiment Station Technical Bulletin 141. 1934. East Lansing.

Hoagland, D. R., and Arnon, D. I. The water-culture method for growing plants without soil. California Agricultural Experiment Station Circular 347. 1938. Berkeley.

Link, G. K. K. The Chicago soil-nutrient-temperature tank. Science, Vol. 81, pp. 204-207. 1935. University of Chicago.

Shive, J. W., and Robbins, W. R. Methods of growing plants in solutions and sand cultures. New Jersey Agricultural Experiment Station Bulletin 636. 1938.

Stuhlsatz, B. Soilless culture at the Amling greenhouses. Florists Exchange, Vol. 92, No. 15, p. 8. April 15, 1939.

Trelease, S. F. Physiologically balanced culture solutions with stable hydrogen-ion concentration. Science, Vol. 78, pp. 438-439. 1933. Columbia University, New York.

Trelease, S. F., and Trelease, H. M. Changes in hydrogen-ion concentration of culture solutions containing nitrate and ammonium nitrogen. American Journal of Botany, Vol. 22, pp. 520-542. 1935.

Wagner, Arnold, and Laurie, Alex. Gravel culture of flowering plants in the greenhouse. Ohio Agricultural Experiment Station Bi-monthly Bulletin, Vol. 24, No. 198, pp. 47-52. 1939. Wooster.

Withrow, R. B., and Biebel, J. P. Nutrient solution methods of greenhouse crop production. Purdue University Agricultural Experiment Station Circular 232. Revised 1938.

BASIC PRINCIPLES OF PLANT GROWTH

"In their growth and functioning, plants carry on two types of processes, one of which is common to all living things, including animals, and the other of which is generally characteristic of plants only. These processes are, respectively, the utilization of food materials, or materials supplying energy and substance for growth, and the production of food. The growth and yield of a plant are regulated by the rate and extent of both of these processes.

"Both the manufacture and utilization of food involve chemical reactions which, though not yet well enough understood to be duplicated in the chemistry laboratory, are known to be controlled by catalysts, either organic or inorganic, or both, as well as by the rate of supply of raw materials and of energy.

"Because food manufacture in the ordinary green plant is a fundamental process upon which subsequent utilization and growth depend, its requirements must be given first consideration. This process, known as photosynthesis or combination through light, occurs in the presence of the green coloring matter of plants, and results in the combination of carbon dioxide of the air with water absorbed from the soil by the roots, at the expense of the energy of light. The product of this combination, thought to be originally simple sugars, appears first as starch. This may be converted into more complex carbohydrates or fats, or may be combined with nitrogen, sulfur, or phosphorus compounds to form proteins; or it may be converted again into simple sugars to be oxidized as a source of energy, in the process of food utilization.

"For the foregoing reactions to proceed rapidly, it is obvious that there must be available an abundant supply of air containing the needed carbon dioxide, water, light of the proper wave-length composition, nitrogen compounds, green coloring matter, as well as the proper catalysts or the chemical elements from which they may be formed. For the utilization of food, oxygen is necessary to release energy, through oxidization of energy-containing materials.

REQUIREMENTS FOR GROWTH OF GREEN PLANTS

"*Light.* The only source of energy which can be utilized to bring about photosynthesis is light; the entire visible spectrum is utilized, the red rays somewhat more efficiently than the others. Practically

any light source of sufficient intensity may be effective, though the absence of any major part of the visible spectrum may exert an influence on the conformation of the plant. Ultraviolet and infrared radiation are apparently not needed in photosynthesis, though each may influence growth, the former usually adversely except in relatively low intensities or duration of exposure.

"The daily duration of exposure to light is important, particularly for certain plants, in which flowering or the development of storage organs is dependent upon the relative length of the alternating dark and light period, or the *photoperiod.*

"*Chemical elements.* Chemical elements required for nutrition of plants may be grouped as those needed in relatively large quantity, such as carbon, hydrogen, and oxygen; in medium quantity, such as calcium, nitrogen, potassium, phosphorus, magnesium, sulfur, and iron (approximately in decreasing order of percentages); and those in relatively small quantities (trace-elements), including boron, zinc, manganese, and copper. The first two groups may be called macro-elements, in contrast with the third group, the micro-elements.

"Because of reciprocal effects of one element on the absorption of certain others, it is necessary to supply the first two groups of elements not only at a rate sufficient to provide for the maximum demand of the plant at any time, but also in certain favorable proportions to each other, or as it is termed, in physiological balance. The trace-elements, on the other hand, may be toxic if their concentration exceeds a certain minimum, which is extremely low in the case of boron.

"*Temperature requirements.* Heat from the environment cannot be used as a source of energy for food manufacture in plants, but it serves to regulate the rate of many physiological processes in plants, such as growth, movement of food materials from one part of the plant to another, and the oxidization of energy-supplying substances, or respiration. Other aspects of the physiology of certain plants which are regulated by temperature are blossoming or the formation of storage organs, particularly in biennial vegetables such as beets, cabbage, celery, and onions. The maintenance of the proper environmental temperature for the physiological processes desired is an important part of plant culture.

METHODS OF NUTRIENT SOLUTION CULTURE

"The methods which have been used are briefly as follows:

"1. *Shive method:* Plants are grown usually singly, in quart jars or other containers, held in place by cork stoppers which are split into two pieces and placed around the stem of the young plant to hold the plant in place in the mouth of the container. The roots dip into the nutrient solution and the tops grow in the air above the

container. New solution can be dropped in continuously from a siphon bottle, or the solution can be renewed once each week or two weeks as the plants require this for growth.

"2. *Gericke method:* Plants are grown in wooden tanks about two feet wide, one foot deep, and ten feet long. The plants are supported by wooden trays approximately four inches deep resting upon the tanks and filled with shavings or other light material. The bottoms of the trays are made of woven wire of suitable mesh to support the layers of excelsior and shavings. Plants are planted with the roots dipping into the solution and are supported by the pressure of the shavings around the stem. Solution must be renewed at intervals of approximately two weeks.

"3. *Withrow method:* Plants are grown in greenhouse benches made of wood or concrete and waterproofed with petroleum asphalt which contains no coal tar or other toxic residues. The benches are filled with cinders or coarse gravel, into which the plants are set. Cinders must be leached previously with a dilute sulphuric acid solution. Three times a day a small electrically driven centrifugal pump forces the nutrient solution from a sump-pit up into the bed. The pump is started automatically by a clock mechanism, operates for a sufficient time to flood the beds, and then is stopped by the same clock mechanism, and the solution drains back through the pump by gravity into the sump-pit. It is stated that all zinc-coated metals should be avoided as carriers or containers of nutrient solution. Even concrete storage tanks have a tendency to change the acidity of solution when not protected by asphalt or other coatings.

REPRESENTATIVE NUTRIENT SOLUTION FORMULAE

(oz. = ounces avoirdupois)

"1. Shives' three salt solution is simple to prepare and has been widely used. (American Journal of Botany, Vol. II, p. 157. 1915.)

Calcium nitrate $Ca(NO_3)_2$	113.4 oz.	for 1000 gallons
Magnesium sulphate $MgSO_4$	240.3 oz.	
Potassium acid phosphate KH_2PO_4	327.9 oz.	

"2. An excellent solution formula has been published by McMurtrey (U.S.D.A. Technical Bulletin 340. 1933). This is as follows, for 1000 gallons of solution:

Calcium nitrate $Ca(NO_3)_2$	135.2 oz.
Potassium nitrate KNO_3	14.6 oz.
Potassium acid phosphate KH_2PO_4	38.3 oz.
Magnesium nitrate $Mg(NO_3)_2 \cdot 6H_2O$	21.2 oz.
Magnesium sulphate $MgSO_4$	10.0 oz.
Ammonium chloride NH_4Cl	9.9 oz.

"3. A solution recommended by Withrow as being especially valuable for winter months follows. This solution can be made from cheap fertilizer salts regularly supplied by fertilizer companies. The amounts listed are for 1000 gallons of solution.

Potassium sulphate (48% potash)	42 oz.
Magnesium sulphate (anhydrous; double the amount if epsom salts are used)	18 oz.
Monocalcium phosphate (20% phosphoric acid) (Fertilizer grade must contain less than 1 per cent. fluorine.)	28 oz.
Potassium nitrate (13% nitrogen, 44% potash)	92 oz.
Ammonium sulphate (20% nitrogen)	30 oz.
Calcium sulphate (Agricultural gypsum)	212 oz.

"4. Another solution made up of acids and bases which are generally available at any chemical laboratory and which has been developed and used successfully at the Boyce Thompson Institute, is as follows, in amounts for 1000 gallons of solution:

Nitric acid HNO_3 concentrated (69.5%)	153.4 oz.
Ammonium hydroxide NH_4OH concentrated (58.6% sp. gr. 0.90)	35.3 oz.
Sulphuric acid H_2SO_4 concentrated (95%)	26.2 oz.
Phosphoric acid H_3PO_4 (90%)	51.5 oz.
Potassium hydroxide KOH	19.09 oz.
Calcium oxide CaO	18.69 oz.
Magnesium oxide MgO	22.02 oz.

"To each of the formulæ listed above traces of iron, boron, and manganese should be added. This can best be accomplished by making up nearly saturated solutions of iron chloride, borax, and manganese chloride, and adding two drops of each for each 50 gallons of solution.

"5. The University of California has published information (Market Growers' Journal, Vol. 62, pp. 46-49, Jan. 15, 1938) on solutions used in the nutrient studies carried on at this university. Two solutions are described on the next page, either of which will prove satisfactory.

"To both of these solutions must be added:

a. Five cc. of 0.5 per cent. ferric tartrate solution per gallon of culture solution, added twice weekly.

b. Hydrated manganous chloride so as to give 0.5 part per million of manganese in the culture solution. If 2 grams of hydrated manganous chloride are dissolved in 1 liter of water, 1 cc. of this solution in each liter of culture solution will give approximately 0.5 part of manganese per million of solution.

c. Borax or boric acid so as to give 0.5 part per million of boron in the culture solution. Such a solution would be provided by adding to each liter of culture solution 1 cc. of a solution of 3 grams of boric acid per liter of water, or 4 cc. of a solution of 10 grams of borax per liter of water.

d. Zinc sulfate (crystalline) so as to give 0.05 part per million of zinc in the culture solution. Such a solution would result by adding to each 10 liters of culture solution 1 cc. of a solution of 4 grams of crystalline zinc sulfate per liter of water.

P. N. Solution

Chemical salt	*For 1 liter of culture solution*	*To make 100 gallons of culture solution*
Calcium nitrate	5 cc $\frac{M}{1}$ solution*	12 oz.
Potassium nitrate	5 cc $\frac{M}{1}$ solution	7 oz.
Potassium di-hydrogen phosphate	1 cc $\frac{M}{1}$ solution	2 oz.
Magnesium sulfate	2 cc $\frac{M}{1}$ solution	3 oz.

T. C. Solution

Chemical salt	*For 1 liter of culture solution*	*To make 100 gallons of culture solution*
Calcium nitrate	4 cc $\frac{M}{1}$ solution*	9 oz.
Potassium nitrate	6 cc $\frac{M}{1}$ solution	9 oz.
Ammonium di-hydrogen phosphate	1 cc $\frac{M}{1}$ solution	2 oz.
Magnesium sulfate	2 cc $\frac{M}{1}$ solution	3 oz.

*$\frac{M}{1}$ solution—a solution containing the molecular weight of the salt in grams per liter of solution.

MECHANICAL CONSIDERATIONS

"*Containers.* For small-scale experiments with nutrient-solution cultures, glass or earthenware containers are satisfactory, both for the cultures and for storage of stock nutrient solutions. The growth of green algæ in glass containers, which may interfere with best experimental procedure, can be discouraged by wrapping the vessels with heavy black paper or covering them with any material which will exclude light.

"For larger-scale cultures, wooden or concrete benches may be used for the growing of plants, and concrete-lined cisterns or sheet-metal tanks are suitable for storage of nutrient solutions. Metals should not remain in contact with the solutions for any considerable time, because sufficient quantities of the metal may be dissolved to be toxic to growing plants. Concrete is soluble enough in the ordinary culture solutions to change the alkalinity thereof. For this reason concrete or metallic containers should be waterproofed with a covering of petroleum asphalt, preferably with a melting-point of about 190 degrees Fahrenheit, applied hot. Several coats of asphalt-emulsion paint may be used, provided that it is free of toxic materials.

"Wooden containers are rendered leak-proof with asphalt; waterproofing is made more certain by lining with felt-base roll roofing material, applied on top of a layer of asphalt on the inside of the wooden trough, and covered in turn with asphalt. Steel drums may be used if asphalt-lined.

"Tanks or benches for plant growing need not be so fully waterproofed if gravel or cinders are used in the drip method, or the subirrigation method with reservoir beneath the bench. Such benches should conform in dimensions with benches used for soil cultures.

"*Aeration.* In drip and subirrigation methods, sufficient oxygen is dissolved in the solution for the needs of the plants, through the relatively large surface of the solution as it is distributed over the surfaces of the gravel or cinders. In water cultures in which the solution remains continuously in contact with the roots of the plants, either the solution must be replaced every week or two, depending upon the volume of the solution in relation to the number of plants growing in it, or it must be aerated. Aeration may be accomplished by any method by which a large surface of solution is exposed to air, such as by causing the solution to flow in finely divided streams or to splash in droplets exposed to air, or by bubbling air through the liquid in the culture containers.

"*Changes in composition of solution* are brought about by the absorption of water and of different ions contained in it at different rates. If the removal of ions leaves the solution either decidedly acid or distinctly alkaline, it is necessary to replace the solution or to add compounds, such as bases or acids, which will neutralize the prevailing ions, to avoid injury to plants. If optimum growth of plants in nutrient solutions is desired, it is necessary to test the acidity of the solution at frequent intervals. For this purpose, indicator solutions for the proper acid or alkaline ranges may be obtained from chemical supply firms. The difficulty may be avoided by the use of solution formulas which remain practically unchanged in acidity as plants remove the different ions (see article by S. F. Trelease, page 181)."

A. J. Stratton, Chairman State Victory Garden Sub-committee on Hydroponics, Pennsylvania State Council of Defense, examines a cucumber grown hydroponically.

WHAT THE SOILLESS VICTORY GARDENER MAY DO

As mentioned, solariums of hospitals or convalescent homes, or sunny porches or terraces of homes or apartments without convenient access to land for vegetable growing, give situations in which soilless Victory gardening may be carried on as a hobby and as a means of producing food. Persons interested in chemical gardening as a hobby, however, might just as well produce some food while indulging in this wholesome, inexpensive pastime.

A bulletin of the Pennsylvania State Council of Defense, prepared by A. J. Stratton, Chairman of the Subcommittee on Hydroponics, Victory Garden Committee, gives helpful hints as to how a practical soilless agricultural program may be carried out as follows:

"Experiments may be confined to a very modest beginning. Containers may be almost any kind of vessel from flower pots to candy pails and wooden boxes. Flower pots are ideal for limited experimentation if used with oversize saucers. Tin cans are not recommended for best results. As a vehicle in which to support the plant and furnish a retaining material for the chemical, quartz sand is recommended. This may be obtained from any dealer in building materials. Limestone sand is objectionable as it upsets the balance of lime included in the chemical solution. Sea sand may be used if sufficiently well washed to remove all traces of salinity. In small containers, such as flower pots, a handful of pebbles or small broken stone may be placed in the bottom to create an air space.

"Either seeds or transplants may be used. If seeds are planted, unusual precautions must be taken to see they do not dry out in the sand bed during the sprouting process. Plain hydrant water should be used until growth is definitely started and then a 50 per cent. diluted chemical solution should be applied until the condition of the plants indicates growth is well established. If seeds are planted, transplanting should take place at the appropriate time in the usual manner. If seedlings are planted, a diluted solution should be used for a few days before increasing it to full strength. It is well to remember that evaporation of water from sand outdoors is rapid and protection of propagating seeds and seedlings may have to be given in the form of a covering—such as moss—which will temporarily retain moisture.

"Every plant solution must contain six major elements, calcium, nitrogen, phosphorus, potassium, magnesium, and sulphur; and should contain trace elements, iron, boron, zinc, copper, and some others. These materials can be made available to the plant only in liquid form. A solution is made by dissolving separately the basic chemicals in a small amount of water; transfer this to the vessel in

which the general solution is to be kept, and add water to make the quantity required by the formula you are using. A simple nutrient solution that has been successfully employed follows:

Monopotassium phosphate—6 grams (about $1\frac{1}{4}$ teaspoonsful)
Calcium nitrate—20 grams (4 rounded teaspoonsful)
Epsom salts—10.5 grams (2 heaping teaspoonsful)
Ammonium sulfate—1.8 grams (about $\frac{1}{3}$ teaspoonful)

per 5 gallons of solution

"It should be noted that trace elements are omitted in this formula. It has been found that some, or all, such elements **may** find their way into the solution through the water used, or through slight impurities in the basic chemicals. However, the addition of trace elements is further assurance of the success of chemical gardening. The following quantities will make a pint of trace solution.

0.8 gram (about 1/6 teaspoonful) each of boric acid (crystals), manganese sulphate, and zinc sulphate, dissolved in a pint of water.

Two teaspoonsful of this solution should be added to a five-gallon solution of basic mixture. In addition to the above, it is very important that iron in solution be given to the plants. A stock formula may be made by dissolving 0.8 gram (about $\frac{1}{4}$ teaspoonful) of ferrous sulphate in a pint of water. Add one teaspoonful of the iron solution to each quart of solution at the time the solution is drawn from your large container for application to the plants. This is done at this time as iron precipitates in the larger solution.

"The chemicals may be purchased at a good drug store and weighed out separately in small packages, ready for use. In this way you will get exactly the proportions required by the formula for the five gallons of solution, and these may be multiplied to secure any quantity of complete solution which you may be able to store. A 50-gallon barrel makes a splendid reservoir and that quantity will last some time, thus relieving you of mixing the solution daily. It is possible to buy at your seed store, or through mail, commercial preparations already mixed containing the chemicals enumerated above. While some of these are now being used in test growths, it is impossible for us to endorse or recommend them.

"If a more elaborate layout is desired but one sufficiently easy of operation and not involving exacting technicalities, a 50-gallon barrel should be thoroughly cleaned and equipped with a spigot for drawing off the solution. Add the trace solution, except iron, in proper proportions to the liquid in the barrel. If you are handy with tools a series of wooden containers may be built, each 6 feet long, 1 foot wide, and 10 inches deep. Coarse gravel or broken stone should be placed in the bottom to a depth of 3 inches and the rest of the space

filled with clean washed quartz sand. Containers must be water-tight and should be set on a slight grade. In the bottom end, or low point, bore a small hole in the container and fit with a wooden plug. At intervals the container should be flushed from the top with hydrant water to remove the accumulation of chemical salts from around the roots of the plants. Sufficient water should be used that liquid will run from the drainage opening. If small containers, such as flower pots, are used the same principle applies. If the pots are set in over-

A. J. Stratton, Chairman, Sub-committee on Hydroponics, Pennsylvania State Council of Defense, measuring a plant grown by soilless agriculture.

size saucers it is well to feed the plant from the saucer, and at intervals flush from the top with hydrant water.

"As the plants in your containers depend entirely for their life on the supply of liquid food, they must be watched very carefully as a few hours of neglect on a hot day will cause damage that possibly cannot be repaired. In the open air, exposed to full sun, plants such as tomatoes, peppers, etc., should be fed amply morning and evening, and on clear days at midday. **Do not overfeed.** If liquid trickles from your drainage plug opening, you may be assured no feeding is required. Sufficient time between feedings should be allowed to insure the penetration of air through the gravel area in your container. Vigorously growing plants will consume considerable quantities of liquid and close observation will be necessary to insure an adequate but not an excessive supply. Planting may be made under full sun under usual garden conditions. Rainfall does not in any way harm the growth but assists in removing salts which may form in the sand. It is good practice after a heavy rainfall to open the drainage plug and allow some of the dissolved salts to escape.

"Do not expect laboratory results from amateur experiments. If sufficient pains are taken with chemical gardening a high yield with a minimum of effort may be expected. If you are really interested in the subject, several books have been published, most of which tend toward the scientific and commercial aspects of the problem. If you purchase some of these books do not let the technicalities frighten you as there is a great field for amateur gardeners in developing methods whereby vegetables and flowers may be intensively grown in small spaces. Should you enter this field you will probably be greatly pleased and surprised at the results of your efforts. Amateurs contributed much to the advancement of radio in its earliest stages, and the intelligent work of scores of gardeners may be helpful in developing this phase of horticulture far beyond its present limits. If you decide to try chemical gardening this season, be sure to keep a record of your work so we may be able to check results at the close of the season.

"When chemical gardening begins there will undoubtedly be many questions which the gardener will wish to have answered. Your committee will endeavor to answer such questions to the best of its ability."

V V V V V V V V

ORNAMENTAL VICTORY GARDENING

Mr. J. F. Styer, member of the Victory Garden Committee, Pennsylvania State Council of Defense, and Chairman of a Subcommittee for Information on Fruit and Ornamental Nursery Stocks, has the following to say concerning ornamental Victory gardening:

"Soldiers or sailors, on their rare days of leave, want to be in real American homes. The 14 men back of the firing line, who support and supply each of the fighters, also look to homes for rest and restored energy. Garden neglect will never inspire them to greater efforts or deeper confidence. Never did our shrubs, trees, and flowers have a more practical work to perform—the work of making morale.

"The Victory gardens will be singled out for attention by all these people, as well as the public. They are bound to be judged on appearance. There must be neatness, and the balance that comes from flowers and attractive backgrounds, and well-tended ornamental plantings about the home itself.

"The nursery industry has the stock for these purposes, and is giving special attention to serving Victory gardens. The nurseryman gives to everyone his practical knowledge of care and arrangement. The purchaser of plants in the coming seasons should remember the nurseryman is going on a war basis too, with less help. and is producing farm and food crops besides. Therefore no heavy demands should be placed on his delivery and planting services. He can take care of all if they help to take the plants to their own homes. Simple planting advice will be available.

"The use of ornamental plants this year will trend toward the more popular varieties and smaller sizes. There will be more annual and perennial flowers, in pots and in the field. The popular evergreens and shade trees will be used in sizes that can be carried or put on the buyer's car. Flowering shrubs and the flowering trees are especially recommended as they do the quickest job of brightening the house and garden. Fruit trees and plants are Victory garden specials and are breaking all quantity records.

"It is suggested that each local committee and garden center add booklets on planting and care of ornamentals to their supplies, and arrange for the near-by nurserymen to assist with their advice.

"The Pennsylvania Victory garden chairman, passing through Reading on March 26, noticed that the front of every trolley bore a large Victory garden poster giving the address of the Victory Garden Center in Reading, where information on the Victory garden program is available.

"This seems a splendid idea for establishing the identity of a Victory garden center and advertising the Victory garden program and may be of use to other counties as a suggestion. Even local Victory garden chairmen might adapt the idea to smaller communities by asking their committee members to put posters on their automobiles with the address of the Victory garden center in their town.

"Will Victory garden chairmen who have developed any new ideas that bring results in their communities write and give them to the state chairman for distribution in the state Victory garden program?

"We are enclosing copies of the Office of Civilian Defense pamphlet, 'Guide for Planning the Local Victory Garden Program,' and also a news release for local Victory garden committee chairmen to hand to their local newspapers.

"A nutrition exhibit, showing the major nutrients in the diet and the foods in which they are found, has been prepared by the Ellen H. Richards Institute at The Pennsylvania State College and the Work Projects Administration for use in the Victory garden program.

"The exhibit consists of models of a wide variety of foods and cards showing the chief nutrients required in the dietary. The contributions of all foods in general and of fruits and vegetables in particular to the dietary are shown by the exhibit.

"One set of exhibit material is being sent to the chairman of the County Council of Defense in each of the 67 counties in the Commonwealth of Pennsylvania. This exhibit is available for work in each of the counties in the Victory garden program. Schools, women's clubs, and other organizations studying nutrition in general and the value of vegetables in the diet in particular may arrange to borrow the exhibit from the chairman of the County Council of Defense."

VICTORY GARDEN SPEAKERS

Every local and county Victory garden committee will need to bring in speakers who are experts in the general field of horticulture and food preservation. In addition, local persons who have had training will serve excellently as speakers on many occasions, provided they inform themselves of the new developments in this field.

Speakers on Victory Gardens may be found among Agricultural Extension specialists in vegetable growing, insect control, disease control, soils, nutrition, and foods; among Agricultural Extension Representatives (County Agents) and Home Economics Extension Representatives; among vocational agriculture and home economics

teachers; among teachers of gardening in horticultural or agricultural schools; among commercial vegetable growers; and among members of garden clubs. Victory garden speakers in general should confer with agricultural or home economics extension representatives of the respective counties in which meetings are held; many helpful suggestions which are applicable to local conditions and circumstances will be received from these representatives.

Where to Place Speakers. Speakers should be placed before meetings brought together especially to consider Victory gardens. Such meetings may be either single, to present timely subjects, such as, for example, garden planning, selection of varieties, soil preparation, seed sowing and transplanting, control of pests which are currently troublesome, canning, drying, storage, and similar topics, or in a series, in which the whole subject is presented in a logical, orderly sequence.

Groups among which meetings may be arranged include garden clubs, women's clubs, service organizations, fraternal orders, parent-teacher associations, labor unions, factory groups, granges, social clubs, junior organizations, classes in schools and Sunday schools—in fact, any groups among whose members an interest in home food production may be aroused.

The Arguments for Home Food Production have been stated repeatedly, in general terms: (1) Food requirements are greater because of the needs of our own and allied armed forces and of civilian populations of allied and reoccupied countries, and because of greater domestic industrial activity; (2) food supplies cannot be increased sufficiently because of shortages of labor and equipment on farms; (3) out-of-season supplies cannot be maintained because of shortages of containers and of transportation facilities. Furthermore, supplies of vegetables never were adequate for best nutrition of the population as a whole and should be increased to bring about maximum health and efficiency of the population in backing up our fighting forces.

Meetings in early summer are specially important to interest new Victory gardeners and to encourage those already engaged in gardening to continue their efforts, to control weeds and pests, and to plant succession crops after others have been harvested; in midsummer, efforts should be made to induce gardeners to conserve their products and see that all are used to the fullest extent. Demonstrations of vegetable cookery or other preparation for the table, of vegetable and fruit canning (particularly pressure canning of nonacid vegetables), freezing, drying, pickling, and brining are specially interesting during midsummer and early fall.

Fall meetings may be devoted to storage, fall care of the garden, exhibiting of vegetables and fruits, and cover crops. Nutritional values of vegetables in relation to the requirements of the family are worthy of discussion at any time.

Points to be Stressed by Pennsylvania Victory Garden Speakers

1. Home production of food is a patriotic activity, a direct contribution to the war effort.

2. Anyone who has access to suitable soil and can devote the necessary time and effort thereto should grow a Victory garden. Farm and other rural families especially should grow as much as possible of their requirements of vegetables and fruits.

3. A Victory garden is any garden in which an effort is being made to produce more food, or food better suited to the needs of the family, than was produced before the war.

4. Preference should be given to kinds of vegetables which yield most heavily of the nutrients most needed, for the space and effort required. Vegetables which yield most of vitamins, minerals, and protein are to be preferred to those which yield only energy, though both should be grown if space and time permit.

5. Every effort should be made to see to the finish each crop which is started. Weeds and pests should not be allowed to bring about the loss of any potential food.

6. The objective of cultivation is the control or elimination of weeds, and that with the minimum disturbance of the roots of the vegetables themselves. Digging or working the soil does little if any good in itself and may do harm if vegetable roots are broken off, as they will be by deep hoeing. Scrape the weeds off at the surface while they are small, or preferably just as they are sprouting.

7. Learn the proper use of lime and fertilizer, to improve the soil and increase the yield and quality of the crops.

8. Control insects and diseases as much as possible by sanitary measures in and about the garden—by elimination of weeds, selection of good seed and plants, choice of adapted, resistant varieties, composting of clean plant materials, elimination of trash, rubbish, or other harboring places for insects near the garden. Hand-picking of certain pests may be practicable. Use poisonous insecticides and fungicides when necessary, but keep them out of reach of the children and of pets or livestock, and do not apply when edible portions have developed on the plants.

9. Allow no products to go to waste. Exchange with neighbors or friends any crops which are not needed at once and which may not be stored readily or conserved for later use.

10. Encourage the children to take part in Victory gardening and food conservation. Make it a family affair. Stimulate interest and rivalry among young people in gardening.

11. Do not neglect other gardening activities besides vegetable growing. Flowers and other ornamental plants have greater value than ever before.

12. Pay most attention to the nutrient values of the vegetables you may produce, and least to their ration point values. The latter may change and are related mainly to the scarcity of the product in the markets; the former are the values of the vegetables themselves in nourishing your family.

Family Nutrition Can Be Improved Only by Providing the Foods Required for Good Nutrition. When They Cannot be Bought, They Must be Grown.

Helpful publications for Victory garden speakers include the following, which may be obtained from the respective organizations listed. Certain of the references cited contain titles of additional publications on the same subject. Unless prices are given, pamphlets of public agencies are free.

Family Nutrition, published by the Philadelphia Child Health Society, 311 South Juniper Street, Philadelphia, Pennsylvania. (Price 25c.)

Vegetables and Fruits in Relation to Human Nutrition in War Time. General Bulletin No. 1, the Ellen H. Richards Institute, The Pennsylvania State College, State College, Pennsylvania.

Pennsylvania Victory Garden Guide for 1943, Pennsylvania State Council of Defense, Capitol, Harrisburg, Pennsylvania.

Suggestions to Industrial Firms on Victory Gardens for Employees, Pennsylvania State Council of Defense, Capitol, Harrisburg, Pennsylvania.

The Home Vegetable Garden, Circular 230, Agricultural Extension Service, The Pennsylvania State College, State College, Pennsylvania.

Victory Garden Leader's Handbook, United States Department of Agriculture, Washington, D. C.

Victory Gardens, Miscellaneous Publication No. 483, United States Department of Agriculture, Washington, D. C.

Conserving Victory Garden Products and Their Chief Nutritional Values, Pennsylvania State Council of Defense, Capitol, Harrisburg, Pennsylvania.

Storing Vegetables, Leaflet 84, Agricultural Extension Service, The Pennsylvania State College, State College, Pennsylvania.

Canning Fruits and Vegetables at Home, Circular 238, Agricultural Extension Service, The Pennsylvania State College, State College, Pennsylvania.

Drying Foods for Victory Meals, Farmers' Bulletin 1918, United State Department of Agriculture, Washington, D. C.

Home Canning of Fruits, Vegetables, and Meats, Farmers' Bulletin 1762, United States Department of Agriculture, Washington, D. C.

Home Drying of Fruits and Vegetables, Leaflet 83, Agricultural Extension Service, The Pennsylvania State College, State College, Pennsylvania.

Vegetable Varieties for Pennsylvania, Leaflet 60, Agricultural Extension Service, The Pennsylvania State College, State College, Pennsylvania.

How to Grow Disease-Free Vegetable Plants, Leaflet 90, Agricultural Extension Service, The Pennsylvania State College, State College, Pennsylvania.

Preventing Disease Losses in the Home Garden, Leaflet 94, Agricultural Extension Service, The Pennsylvania State College, State College, Pennsylvania.

Control of Vegetable Insects in the Home Garden, Circular 246, Agricultural Extension Service, The Pennsylvania State College, State College, Pennsylvania.

Insects Attacking Ornamental Flowering Plants, Circular 161, Agricultural Extension Service, The Pennsylvania State College, State College, Pennsylvania.

Textbooks on Vegetable Growing are specially valuable sources of information for Victory garden speakers. Selected ones emphasizing home gardening include:

A Manual of Home Vegetable Gardening by Francis C. Coulter. Doubleday, Doran and Company, Garden City, New York. 1942. ($2.50)

Grow Your Own Vegetables by Paul W. Dempsey. Houghton Mifflin Company, New York, New York. ($2.50)

Vegetable Gardening in Color by Daniel J. Foley. The Macmillan Company, New York, New York. 1943. ($2.50)

The Pocket Book of Vegetable Gardening by C. H. Nissley. Pocket Books, Inc., New York, New York. 1942. (25c)

A few outstanding textbooks emphasizing commercial production include:

The Vegetable Growing Business, by Ralph L. Watts and Gilbert S. Watts. Orange Judd Company, New York, New York.

Vegetable Crops, by H. C. Thompson. McGraw-Hill Company, New York, New York.

Vegetable Growing, by J. E. Knott. Lea and Febiger, Philadelphia, Pennsylvania.

Pamphlets including somewhat more detailed information than that in the circulars listed earlier, which is useful as a general background for Victory speakers might also be mentioned. Two examples are:

The City Home Garden, United States Department of Agriculture Farmers' Bulletin 1044 revised 1942, Office of Information, United States Department of Agriculture, Washington, D. C.

Diseases and Insects of Garden Vegetables, Farmers' Bulletin 1371 revised 1938, Office of Information, United States Department of Agriculture, Washington, D. C.

Note: If the supply in the Office of Information has been exhausted, the above two bulletins may be obtained from the Superintendent of Documents, Government Printing Office, Washington, D. C., for 5 and 10 cents respectively.

Brussels Sprouts from a Pennsylvania Victory Garden.

VICTORY GARDEN JUNIOR PLAYS

The Victory Garden Junior Play is a valuable adjunct to the school garden, or it may be featured at school even if no school garden project is undertaken, as a means of stimulating interest in Victory gardening in the homes of the children reached in this manner. Another connection in which the Victory Garden Play has merit is as a part of the Victory Garden Show. At stated periods, music and a Victory Garden Play can add considerable zest to the show of Victory Garden and Victory Garden Food Conservation products.

Each community may have someone with especial talent in play writing, who may wish to rewrite one or the other of the two plays suggested below. Or, the plays may be used as they stand, or they may be substituted by something else created out of whole cloth.

VICTORY GARDENS HELP THE FOOD SUPPLY

Play Submitted by Virginia S. Masland, Chairman,
Cumberland County Victory Garden Committee,
Carlisle, Pennsylvania

Setting: Outside wall of garden.

Characters: Two boys, one dressed in street clothes, other in overalls.

Equipment: Wheelbarrow, garden tools, flat of plants and packets of seeds.

First boy: Where are you going and what's all the equipment?

Second boy: Haven't you been reading about the Government taking one-third to one-half of all the vegetables the farmers can grow this year to feed our fighting men and allies?

First boy: Won't there still be plenty for all?

Second boy: No, there can't be unless we produce more.

First boy: All you produce won't affect the supply much.

Second boy: I know it won't, but I'm going to take care of my own family so I don't need to take from someone who can't produce his own.

First boy: How big a garden are you planning for and what will it cost?

Second boy: Our garden plot will be 25x30 and will cost $5. It's as much as I can care for well. It doesn't pay to plant more than you can care for, because the Government wants every seed to grow and every ounce of fertilizer to do its work. There is a shortage of materials and seed, too.

First boy: With that much investment how much can you harvest from your garden?

Second boy: Here's an interesting fact. Did you know that one dozen tomato plants cost about 20c, if properly cared for will produce about 20 quarts of canned fruit and still give us all we want to use fresh, or about $4 worth.

First boy: Boy! That's a good return on your money—I think I'll do it too. Is there anything else you can save for winter?

Second boy: Mother has been attending the nutrition classes and has gotten all the information on storing, canning, and preserving our surplus. Miss Beegle, the County home economics director, has all the bulletins on that subject. Your mother can catch up with the class by reading them.

First boy: Tell me, how do you go about getting ready for your garden, planning and preparing the ground and fertilizing, and so on?

Second boy: I haven't time to tell you now. I must get these plants in the ground. But if you'll see our County Agent, Mr. Gault, or Mr. Robert Sterrett at the high school, they'll give you all the dope.

HOE! HOE! VITAMIN

Play In One Act

By Mrs. Carey O. Miller, Chairman,
Dauphin County Victory Garden Committee

Scene: Vegetable Army Camp. (One large tent)

Cast: Captain Asparagus Root
1st Lieutenant Cauliflower Broccoli
2nd Lieutenant Ear O'Corn (very Irish)
Sergeant Garlic Onion Smelly
Bugler—Corporal Pepper Pumpkin Parsnip
Private Squash Potato (Spud)
Private Tom Ato
Private Herb Parsley
Nurse—Ray O'Sunshine
Nurse—Romaine Lettuce
Major—String Bean
His twins—Lima Bean
Soy Bean
Indian Chief—Big Red Beet

Scene opens with Privates Potato, Ato and Parsley shining shoes and singing:

For he's a jolly good fellow
For he's a jolly good fellow
For he's a jolly good fellow
This Vita-Min Hero of mine.

Private Potato: Say Ato, did you hear that the President has ordered Vita-Mins assigned to every man in the United States Army?

Private Ato: Yeh, I did and Secretary of Agriculture Wickard says all the home folks better become acquainted with the Vita-Mins too.

Private Parsley: I guess that's what Sarg meant when he said that our outfit is the most important in the world!

Privates rise and salute as Sergeant enters tent.

Sergeant: At ease. We sure have a job, we're moving out o' here today. We've gotta 'stablish camps on every piece of ground in the country!

Three Privates: Gosh! How's that going to be done?

Sergeant: Well, all over the U. S. A., Victory Garden Committees of Civilian Defense are enlisting people to give our men places to live. Places where they will be treated kindly! At-Ten-Tion!!!

Enter Captain and 2 Lieutenants. Captain smiles and says:

At ease, men! We come to pin on you your citations for bravery, your Cab-badges. You fellows are the beginning of the greatest march in this emergency! Before June 1st our army will be stationed all over the U. S. A. and will have millions of boys and girls, men and women helping us.

Lieutenant O'Corn: Faith! an' here comes Chief Red Beet.

Enter Indian Chief who says **slowly**: Ugh morning ugh. White men soldiers, my braves join up—they want good red blood in U. S. soldiers and people. Ugh!

Captain: Good, Chief Beet. (Goes to tent opening.) I see your men are settled in their tepees. (Tom-toms heard in distance.)

Chief sits tailor fashion on floor and puts stem of long pipe into mouth.

Major Bean enters (returns salute): This is going to be an informal talk, men. I know you have been told of the probability of invasion by our enemies—malnutrition, illness, discontent, and death. When you joined this regiment you were told your task would be bigger as the war progressed. Well, men, the time has come when **we** go to the front! O. C. D. is doing a swell job in organizing the country and giving people soil, information and advice and all of their efforts fail unless every one of **you** gives the best **he** has. Do you understand?

Men (all): Yes, Sir!

Bell rings outside as ambulance passes.

Soy and Lima Bean Twins rush in to the Major crying: Oh, Daddy, they've taken all our little carrot friends to the hospital. They are **so** sick!

Major: I was afraid they would be—no vegetable can stand too much water. You know, children, that you get colds when **your** feet get wet.

Nurses enter. Sunshine speaks: Major Bean, we are sorry to report the death of every carrot in this regiment.

Major: Why did they die?

Nurse Lettuce: Well, Major, because of weeds, thirst, and from pneumonia, because of too much water and lack of tonic and fertilizer, and because of undernourishment.

Twins: Will we have a new carrot division, Daddy?

Major: No, my dears, at least not here. This afternoon the President comes and you will all be made generals and then you will travel all over these great United States forming battalions of vegetables bearing your name. And you, the nurses, will go into every Office of Civilian Defense and train workers there as you did in Pennsylvania last year where there were 750,000 gardens produced and where there *will be* 1,400,000 *gardens this year!* Every one of you men has been drilled and instructed so that you are real leaders. You know what your job is and where it can be done best. I send you out knowing that when your job will be finished you will have played as big a part in attaining Victory as our Armed Forces. So go, men and women, find hands eager to help you and increase your size so that the Vegetable Army of the United States Civilian Defense Corps will go down in history in a blaze of Vita-Min Glory!! Corporal Parsnip, sound call to quarters, and may this be the end of strife and the beginning of a world embraced by the American Way of Life.

CURTAIN

Suggest faces and heads be made of crepe paper to resemble vegetable (name).

Nurse Sunshine—Bright smiling young person in nurse's uniform.

Nurse Lettuce—Pale green mask over entire face.

VICTORY GARDEN SHOWS

At season's end, nothing will serve better as a public education measure, than the holding of a Victory Garden Show. This may be a part of a national movement to display victory garden products and raise funds for some worthy wartime purpose, or it may be strictly a local effort, with or without an admission charge.

In 1942 and 1943, the Victory Garden Harvest Shows were held on a nation-wide basis, with admission charges going to such purposes as Army and Navy Relief. During these same years, many localities held their Victory Garden Shows independently, either charging no admission or charging a nominal admission fee which went to some wartime need. The choice of method of holding the Victory Garden Show is strictly one for local decision.

Close-up of exhibit of canned products at Westinghouse Educational Center Victory Gardens, supervised by B. P. Hess, Westinghouse Electric and Manufacturing Company, Pittsburgh, Pennsylvania.

—Westinghouse Photo

In planning the Victory Garden Show, local members of horticultural organizations or commercial horticulturists, including garden club members, nurserymen, and florists, are urged to volunteer their services. Communicate with county or local Victory Garden Committee chairmen, and if no show chairman has been designated for your locality, please volunteer your services or urge that a suitable chairman be appointed.

Time for the Victory Garden Show

The best time for a Victory Garden Show will be the time when, in each community the most and best garden material, including flowers, is available. By determining the date in advance, gardeners may prepare their plans in such a way that material will be available for display at the time arranged.

Exhibit Materials

The Victory Garden program offers a wide variety of possible exhibit material for the annual show. The following types of display items are suggestive:

Vegetables and fruits, either as individual items in competition, or as baskets showing various combinations of products, or as combinations of vegetables and fruits making broad contributions to the family dietary from the nutritional point of view.

Flowers and floral arrangements.

A part of the Victory Garden exhibit in Reading, Pennsylvania, at the end of the season, 1943. Prizes were offered for major fresh and canned vegetables as well as flowers and floral arrangements.

Educational displays on culture of fruits and vegetables, and on their nutritional contributions to the dietary. Suggested cards for assisting in this display are given later in this report.

Canned products—fruits, vegetables, other products conserved in the Victory Garden Food Conservation Kitchen.

Dehydrated or frozen products (if a display of the latter is possible).

Wild Flowers

Display Gardens

It is suggested that demonstrations on certain cultural practices in gardening, and on canning, as well as music and one-act plays be given in connection with the Victory Garden Show.

In past Victory Garden Shows, some groups have used canned foods, fresh fruits and vegetables insofar as they are available, and pictures or models of other foods, together with posters and cards on conservation and nutrient value of common foods.

Five sets of display cards are suggested herewith, on the following subjects:

1. Conservation of minerals and vitamins in vegetables and fruits;
2. The nutrient value of fresh vegetables and fruits;
3. The nutrient value of canned vegetables and fruits;
4. Nutrient values of foods other than fruits and vegetables;
5. Nutrient values of whole-grain cereal products.

Here are the display set suggestions:

DISPLAY SET I

Conservation of Minerals and Vitamins in Vegetables and Fruits

Card 1.

CONSERVATION OF MINERALS AND VITAMINS IN VICTORY GARDEN PRODUCTS

War Time Requires that Nothing be Wasted! Conserve all nutritive values of vegetables and fruits in cooking and preserving.

Card 2.

DON'TS IN CONSERVING NUTRITIVE VALUES OF FRUITS AND VEGETABLES

Don't use soda in cooking.
Don't soak fruits and vegetables in water, especially after peeling, slicing, or dicing.
Don't use more water than necessary in cooking.
Don't discard cooking water.
Don't freeze or dry green and yellow vegetables without brief scalding or steaming.
Don't allow shredded, sliced, or diced fruits and vegetables to stand before serving, cooking, freezing, or drying.
Don't cook longer than necessary to render foods palatable and digestible.

Card 3.

TO CONSERVE MINERALS IN FRUITS AND VEGETABLES

Cook in minimum quantity of water, and **do not discard cooking water. Do not soak** salad fruits and vegetables, especially if they are sliced or shredded.

Store by any convenient method; **do not soak or wash** fruits or vegetables after peeling, slicing, or dicing, before freezing, canning, or drying.

Card 4.

TO CONSERVE VITAMIN A IN FRUITS AND VEGETABLES

Cook just enough to render digestible; for salads, serve immediately if shredded or thinly sliced, or preferably **do not shred or slice thinly.**

Store in light if cool or cold stored, but in darkness if canned; scald or steam briefly before freezing, drying, or canning.

LOSS OF GREEN OR YELLOW COLOR MEANS LOSS OF VITAMIN A IN FRUITS AND VEGETABLES

Card 5.

TO CONSERVE VITAMIN B_1 OR THIAMIN IN FRUITS AND VEGETABLES

Cook in minimum quantity of water just long enough to render digestible, **do not discard cooking water.**

Store by any convenient method, preferably by freezing, but **do not sulphur** before drying.

Card 6.

TO CONSERVE VITAMIN B_2 OR RIBOFLAVIN IN FRUITS AND VEGETABLES

Cook in absence of light and in minimum quantity of water; **do not discard cooking water.**

Store by any convenient method; **do not dry in sun** or other light. (Light destroys vitamin B_2 if temperature is high).

Card 7.

TO CONSERVE NIACIN IN FRUITS AND VEGETABLES

Cook in minimum quantity of water, and **do not discard cooking water.**

Store by any convenient method.

Card 8.

TO CONSERVE VITAMIN C
IN FRUITS AND VEGETABLES

Cook in shortest possible time, in minimum quantity of water, preferably in acid medium, or **serve raw, not shredded or thinly sliced.**

Store in cold storage, in frozen lockers, or canned in acid medium. Some losses occur in all types of storage.

DISPLAY SET II
Nutrient Value of Fresh and Properly Cooked Vegetables and Fruits

Card 1.

CABBAGE

(**Raw,** or cooked for a very short time with Extreme Care). A Very Rich Source of Vitamin C.

Also makes notable contribution to the day's need of protein, calcium, phosphorus, vitamin A, B_1 (thiamin), and B_2 (riboflavin).

General Notes: One large portion of cabbage, raw or cooked with extreme care for a very short time, supplies the following percentages of the day's requirement of the specified nutrients, using an average-sized man of moderate activity as the criterion:

About 2 per cent. of the day's need of protein;
About 6.1 per cent. of the day's need of calcium;
About 2.1 per cent. of the day's need of phosphorus;
About 3.3 per cent. of the day's need of iron;
About 1.0 per cent. of the day's need of vitamin A;
About 6.1 per cent. of the day's need of vitamin B_1, (thiamin);

About 3.7 per cent. of the day's need of vitamin B_2, (riboflavin);
About 60 per cent. of the day's need of vitamin C, (ascorbic acid);
About 1.8 per cent. of the day's need of niacin.

The amounts given above are based upon the whole head of cabbage. The loose outer leaves of cabbage are a rich source of calcium, with only meager amounts in the rest of the head.

Other cards are prepared in the same manner, using the following arbitrary criteria in designating the nutrient content of the vegetables or fruits.

If a standard portion of the vegetable or fruit supplies at least one-fourth the day's requirement of a certain nutrient by a man of average size and moderate activity (the unit man of the Bureau of Home Economics), it is marked **Rich** in that nutrient.

If the quantity of the nutrient in a standard portion approaches the full day's need, or reaches or exceeds this need, it is marked **Very Rich.**

If the quantity of a nutrient in a standard portion gives from 10 to 24 per cent. of the day's requirement, this is listed as **Good** source of the nutrient.

If the quantity of the nutrient in a standard portion of the vegetable or fruit has from two to nine per cent. of the day's requirement, it is listed as making a notable contribution of this nutrient.

If the vegetable or fruit is listed as containing **Some** of a certain nutrient, it contains less than two per cent. of the daily requirement thereof.

Another view of the Reading Victory Garden show. **See page 205**

It will be noted that the basis of calculating the contribution of a certain nutrient to the dietary is the proportion of the day's need of this nutrient supplied by the usual sized portion of this food. This is based on the recommended allowances of the National Research Council, Committee on Foods and Nutrition.

In short, calculations of the richness of a certain food in a certain nutrient depends on **What proportion of the need for the nutrient one portion of the food supplies,** not the amount of the nutrient there in the absolute sense. For example, 8000 International Units of vitamin A from mixed food sources are recommended daily, for the average man, but only 0.8 gram of calcium. If a food supplies a substantial proportion (25 per cent.) of either of these amounts of the respective nutrients, it is a **rich** source of the nutrient in question.

On the following pages are given additional suggestions for cards for Display Set II, showing the nutrient value of fresh and properly cooked vegetables and fruits. The frames have been omitted on these to conserve space in this article.

The cards for Display Set III, pages 220-223, give the nutrient values of home canned vegetables and fruits. The cards for Display Set IV, pages 223-227, give the nutrient value of meat, milk, eggs. The cards for Display Set V, pages 227-231, give the nutrient value of cereal grain products.

Card 2.

GOLDEN BANTAM SWEET CORN

Good source of vegetable phosphorus and vitamin A.
Also makes noteworthy contributions of protein, iron, vitamin B_1 (thiamin), vitamin B_2 (riboflavin), and vitamin C.

Card 3.

LIMA BEANS

Rich source of vitamin C.
Good source of vegetable protein, iron, vitamins B_1 (thiamin), B_2 (riboflavin).
(An increase of lima beans in the diet will replace some of the nutrients of meat in times of meat shortage.)
Also makes noteworthy contributions of calcium and phosphorus.

Card 4.

NAVY, PINTO, AND KIDNEY BEANS—FRESH

Rich source of iron.
Good source of protein, phosphorus, vitamin B_1 (thiamin), and vitamin B_2 (riboflavin).
(An increase of beans in the dietary will replace some of the nutrients in meat in times of meat shortage.)
Also makes distinct contribution of calcium.

Card 5.

NAVY, PINTO, AND KIDNEY BEANS—DRY

Rich source of iron.
Good source of protein, phosphorus, vitamin B_1 (thiamin), and vitamin B_2 (riboflavin).
Also make notable contribution of calcium.

Card 6.

SNAP BEANS

Rich source of vitamin C.
Good source of iron and vitamin A.
Also make notable contribution of protein, calcium, phosphorus, vitamin B_1 (thiamin) and vitamin B_2 (riboflavin).

Card 7.

SOY BEANS—FRESH

One of the best vegetable sources of protein.
Rich source of iron, vitamin B_1 (thiamin), and vitamin C.
Good source of phosphorus, vitamin B_2 (riboflavin).
(The use of soy beans in the diet will replace some of the nutrients of meat in times of meat shortage.)
Also make notable contributions of calcium and vitamin A.

Card 8.

SOY BEANS—DRY

Highest vegetable source of protein.
Rich source of iron, vitamin B_1 (thiamin), and vitamin B_2 (riboflavin).
Good source of calcium and phosphorus.
(The use of soy beans in the diet will replace some of the nutrients of meat in times of meat shortage.)
Also noteworthy source of vitamin A.

Card 9.

BEAN SPROUTS (MUNG)

Very rich source of vitamin C.
Also makes small but notable contribution of many other minerals and of most of the vitamins.

Card 10.

BEETS

Contribute small amounts of many nutrients.
Also make noteworthy contributions of protein, and of each of the major minerals, and vitamins.

Card 11.

BEET GREENS

Very rich source of vitamin A.
Rich source of iron, vitamin B_1 (thiamin), and vitamin C.
Good source of calcium.
Also make noteworthy contributions of protein, phosphorus, and vitamin B_1 (thiamin).

Card 12.

BROCCOLI

Very rich source of vitamin C.
Rich source of vitamin A.
Good source of calcium, iron, and also makes noteworthy contribution of protein, calcium, vitamin B_1 (thiamin), and vitamin B_2 (riboflavin).

Card 13.

BRUSSELS SPROUTS

Rich source of vitamin C.
Also make noteworthy contributions of all major minerals and all other major vitamins.

Card 14.

CARROTS

One of the highest sources of vitamin A.
Also make noteworthy contribution of calcium, phosphorus, iron, vitamin B_1 (thiamin), vitamin B_2 (riboflavin), niacin, and vitamin C.

Card 15.

CAULIFLOWER

A rich source of vitamin C.
Also makes noteworthy contribution of protein, calcium, phosphorus, vitamin A and vitamin B_2 (riboflavin).

Card 16.

CHARD

Very rich source of vitamin A.
Good source of iron and vitamin C.
Also makes noteworthy contributions of calcium and vitamin B_2 (riboflavin).

Card 17.

COLLARDS

Rich source of calcium, vitamin A, and vitamin C.
Good source of iron, vitamin B_1 (thiamin), and vitamin B_2 (riboflavin).
Also make noteworthy contributions of protein and phosphorus.

Card 18.

CUCUMBERS

Make notable contributions of iron, vitamin B_1 (thiamin), vitamin B_2 (riboflavin), and vitamin C.

Also contain small amounts of other nutrients.

—Westinghouse Photo

Mrs. John Yex, of 7321 Kelly Street, Pittsburgh, Pennsylvania, displays the Victory Garden products that won one of the top prizes for her and her husband in a contest among war-working gardeners of the Westinghouse Electric & Manufacturing Company. The Victory Garden program was sponsored by the Westinghouse Educational Center which won the highest award given by the National Victory Garden Institute.

Card 19.

EGG PLANTS

Make notable contributions of iron, vitamin B_1 (thiamin), and vitamin C.
Also contain small amounts of other nutrients.

Card 20.

ENDIVE AND ESCAROLE

Good source of vitamins A and B_2 (riboflavin).
Also make noteworthy contributions of calcium, iron, vitamin B_1 (thiamin) and vitamin C.

Card 21.

GREENS IN GENERAL

Very rich source of vitamin A.
Rich source of calcium, iron, vitamin B_2 (riboflavin), and vitamin C.
Also make noteworthy contributions of phosphorus, and vitamin B_1 (thiamin).

Card 22.

KALE

Very rich source of vitamins A and C.
Rich source of calcium.
Good source of iron, vitamin B_1 (thiamin), and vitamin B_2 (riboflavin).
Also makes noteworthy contribution of phosphorus.

Card 23.

KOHLRABI

Very rich source of vitamin C.
Good source of calcium.
Also makes noteworthy contribution of protein, phosphorus, iron, and vitamin B_1 (thiamin).

Card 24.

LETTUCE—ICEBERG

Noteworthy amounts of vitamin C.
Contributes very small amounts of the major minerals and the other major vitamins.

Card 25.

LETTUCE—GREEN LEAF

Good source of vitamin A.
Also makes noteworthy contribution of calcium, iron, vitamins B_1 (thiamin), B_2 (riboflavin), and C.

Card 26.

OKRA

Good source of vitamin A.
Also makes noteworthy contributions of calcium, phosphorus, iron, vitamin B_1 (thiamin), and vitamin C.

Card 27.

ONION—MATURE

Good source of vitamin B_2 (riboflavin) and vitamin C.
Also makes noteworthy contributions of protein, calcium, phosphorus, iron, and vitamin B_1 (thiamin).

Card 28.

PARSLEY

A FOOD, NOT MERELY AN ORNAMENT.
Very rich source of vitamin A.
Good source of vitamin C.
Also makes noteworthy contributions of calcium and iron.

—Westinghouse Photo

Canned vegetable exhibit, November 1943, Westinghouse Educational Center Victory Gardens, planned and developed by B. P. Hess, Westinghouse Electric and Manufacturing Company, Pittsburgh, Pennsylvania.

Card 29.

PARSNIPS

Rich source of vitamin C.
Good source of vitamin B_1 (thiamin).
Make noteworthy contributions of protein, calcium, phosphorus, iron.

Card 30.

PEAS

Rich source of vitamin C.
Good source of phosphorus, iron, vitamins A, B_1 (thiamin), B_2 (riboflavin).
Also make noteworthy contribution of calcium.

Card 31.

PEPPERS (Red or Green)

Very rich source of vitamin A and vitamin C.
Also make noteworthy contributions of phosphorus, iron, vitamin B_1 (thiamin), and vitamin B_2 (riboflavin).

Card 32.

POTATOES—IRISH

(If properly cooked and not peeled, or peeled very thin)
Rich source of vitamin B_2 (riboflavin), and vitamin C.
Good source of iron.
Also make notable contributions of protein, calcium, phosphorus, and vitamin B_1 (thiamin).

Card 33.

POTATOES—SWEET

Rich source of vitamins A and C.
Good source of phosphorus, iron, and vitamin B_1 (thiamin).
Also makes noteworthy contributions of protein, calcium, and vitamin B_2 (riboflavin).

Card 34.

PUMPKINS

One of the best sources of vitamin A.
Good source of vitamin B_1 (thiamin).
Also contributes calcium, phosphorus, iron, and vitamin B_2.

Card 35.

RADISH

Not high in any one nutrient, but contributes some of almost all nutrients.
A little of many nutrients is as important as a great deal of only a few nutrients.

Card 36.

RUTABAGAS

Rich source of vitamin C.
Good source of calcium.
Noteworthy contributions of phosphorus, iron, vitamins B_1 and B_2.

Card 37.

SPINACH

Rich source of vitamin A.
Good source of iron and vitamin C.
Also makes noteworthy contributions of phosphorus and vitamin B_2

Card 38.

SQUASH—SUMMER

Small, but noteworthy contributions of many minerals and vitamins.

Card 39.

SQUASH—WINTER

Rich source of vitamin A.
Also makes notable contributions of protein, calcium, phosphorus, iron, vitamin B_1 (thiamin), and vitamin B_2 (riboflavin).

Card 40.

TOMATOES—RED

Rich source of vitamin C.
Good source of vitamin A.
Also make noteworthy contributions of phosphorus, iron, vitamin B_1 (thiamin), and vitamin B_2 (riboflavin).

Card 41.

TURNIP GREENS

One of the highest sources of vitamin A.
An excellent source of calcium, iron, and vitamin B_2 (riboflavin).
Also a good source of vitamin B_1 (thiamin), and vitamin C.

Card 42.

TURNIP ROOTS

Rich source of vitamin C.
Small, but noteworthy contributions of many minerals and vitamins.

Card 43.

APPLES

Good source of vitamin C.
Make notable contributions of all major vitamins and minerals.

Card 44.

APRICOTS

Very rich source of vitamin A.
Also make notable contributions of iron, vitamin B_1 (thiamin), and vitamin C.

Card 45.

BLACKBERRIES

Make small but noteworthy contributions of most of the minerals and vitamins.

Card 46.

BLUEBERRIES

Good source of vitamin C.
Also make noteworthy contributions of calcium, iron, and vitamin B_1 (thiamin).

Card 47.

CANTALOUPES AND SIMILAR MELONS

A very rich source of vitamins A and C, and a noteworthy source of calcium, iron, vitamin B_1 and vitamin B_2.
Also supply a small amount of protein and phosphorus.

Card 48.

CHERRIES

Good source of vitamin C.
Also make noteworthy contributions of iron, vitamin A, vitamin B_1 (thiamin), and vitamin B_2 (riboflavin).

Card 49.

GRAPES

Make noteworthy contributions of iron, vitamin B_1 (thiamin), and vitamin C.

Card 50.

NECTARINES

Very rich source of vitamin C.
Good source of vitamin A.
Also make noteworthy contributions of iron, and vitamin B_1 (thiamin).

Card 51.

PEACHES

Good source of vitamins A and C.
Also make noteworthy contributions of iron, and vitamin B_1 (thiamin).

Card 52.

PEARS

Contribute small but noteworthy amounts of all of the major minerals and vitamins.

Card 53.

PLUMS AND FRESH PRUNES

Contribute small but noteworthy amounts of all the major minerals and vitamins.

Card 54.

RASPBERRIES

Good source of vitamin C.
Also make noteworthy contributions of calcium, phosphorus, and iron.

Card 55.

STRAWBERRIES

Very rich source of vitamin C.
Also make small contributions of all major minerals and vitamins.

Card 56.

WATERMELONS

A generous slice supplies one-third to one-half of the day's need of vitamin C.
Also makes small but noteworthy contributions of minerals and other vitamins, particularly A, B_1 and B_2.

DISPLAY SET III
Nutrient Value of Home-Canned Vegetables and Fruits

CANNED VEGETABLES

Card 1.

CANNED ASPARAGUS

Good source of calcium and phosphorus.
Notable contributions of iron, vitamin A, and vitamin B_1 (thiamin).

Card 2.

CANNED BEANS

Good source of vitamin A.
Also makes notable contribution of protein, calcium, phosphorus, iron, and vitamin B_1 (thiamin).

Card 3.

CANNED BEETS

Small but noteworthy source of protein, and of all the major minerals and vitamins.

Card 4.

CANNED CARROTS

Rich source of vitamin A.
Also make noteworthy contribution of all major minerals and vitamins.

Card 5.

CANNED CORN, SWEET—YELLOW

Makes notable contributions of all major minerals and vitamins.

Card 6.

CUCUMBER PICKLES

Make small but noteworthy contribution of many minerals and vitamins.

Card 7.

CANNED PEAS

Make good contribution of protein, iron, vitamin B_1, and vitamin C.
Also make noteworthy contributions of phosphorus, and vitamin B_2 (riboflavin).

Card 8.

CANNED RHUBARB

Makes small but noteworthy contributions of many minerals and vitamins.

Card 9.

CANNED TOMATOES

Very rich source of vitamin C.
Good source of vitamin A.
Also make noteworthy contributions of phosphorus, iron, vitamin B_1 (thiamin), and vitamin B_2 (riboflavin).

Card 10.

CANNED TOMATO JUICE

Very rich source of vitamin C.
Good source of vitamin A.
Also makes noteworthy contributions of iron, vitamin B_1 (thiamin), and vitamin B_2 (riboflavin).

Card 11.

CANNED APPLE JUICE

Makes small but important contribution of many minerals and vitamins.

Card 12.

CANNED APPLESAUCE

Makes small but important contribution of all major minerals and vitamins.

Card 13.

CANNED APRICOTS

Very rich source of vitamin A.
Small but important contribution of all major minerals and vitamins.

Card 14.

CANNED BLACKBERRIES

Make small but important contributions of many minerals and vitamins.

Card 15.

CANNED CHERRIES

Make small but important contributions of many minerals and vitamins.

Card 16.

CANNED GRAPE JUICE

Makes small but important contribution of all major minerals and vitamins.

Card 17.

CANNED PEACHES

Good source of vitamin A.
Make small but important contributions of many minerals and vitamins.

Card 18.

CANNED PEARS

Make small but important contributions of many minerals and vitamins.

Card 19.

CANNED PLUMS

Make small but important contributions of many minerals and vitamins.

Card 20.

CANNED RASPBERRIES

Make small but important contributions of many minerals and vitamins.

DISPLAY SET IV

Nutrient Value of Meat, Milk, Eggs

Card 1.

LEAN BEEF

A rich source of protein.

A rich source of phosphorus.

A rich source of iron.

A rich source of vitamins B_1, B_2, and niacin.

Also contributes noteworthy amounts of calcium.

Card 2.

LAMB OR VEAL

A good source of protein, iron, and niacin.
A notable source of phosphorus and vitamins B_1 and B_2.

Card 3.

SMOKED HAM

A rich source of protein, niacin, and vitamin B_1.
A good source of phosphorus and iron.
Also contributes noteworthy amounts of calcium and vitamin B_2.

Card 4.

LIVER

(Calf, Beef, or Lamb)

A very rich source of vitamin A, niacin, and iron.
A rich source of protein.
A rich source of phosphorus.
A rich source of vitamins C and B_2.
A good source of vitamin B_1.

Card 5.

PORK CHOP

A rich source of protein and niacin.
A good source of phosphorus and iron.
A good source of vitamin B_1.
A notable source of vitamin B_2.

Card 6.

PORK ROAST (LEAN)

A rich source of protein and iron.
A rich source of niacin and vitamin B_1.
Also makes notable contributions of calcium, phosphorus, and vitamin B_2.

Card 7.

SWEETBREADS

A rich source of phosphorus.
A good source of protein and niacin.
A notable source of iron.
Also a notable source of vitamins B_1, B_2, and C.

Card 8.

CHICKEN

A rich source of protein and niacin.
A good source of phosphorus and iron.
A good source of vitamins B_1 and B_2.
Also contributes noteworthy amounts of calcium and vitamin C.

Card 9.

DUCK

A rich source of protein and iron.
A good source of phosphorus.
A notable source of calcium.

Card 10.

TURKEY

A rich source of protein, iron, and niacin.
A good source of phosphorus and vitamin B_2.
A notable source of calcium and vitamin B_1.

Card 11.

BACON

Makes notable contributions of protein and iron.

Card 12.

RABBIT

A rich source of iron and niacin.
A good source of protein and phosphorus.
A notable source of vitamins B_2 and C.

Card 13.

SAUSAGE, BEEF AND PORK

A good source of protein.
A notable source of vitamin B_1.
Also makes noteworthy contributions of phosphorus and iron.

Card 14.

LIVER SAUSAGE

A good source of iron.
A notable source of protein and phosphorus.
A notable source of vitamin B_1.

Card 15.

WIENERWURST OR FRANKFURT

A notable source of protein.
Also a notable source of phosphorus and iron.

Card 16.

FRESH FISH
(Broiled or Fried)

A good source of protein and phosphorus.
A notable source of calcium and iron.
A notable source of vitamins B_1 and B_2.
(Halibut steak is a rich source of niacin.)

Card 17.

CANNED SALMON

A good source of protein, calcium, phosphorus, and niacin.
A notable source of iron and vitamins A, D, B_1, and B_2.

Card 18.

OYSTERS

A rich source of iron.
A good source of protein, phosphorus, and vitamin B_1.
Also contributes noteworthy amounts of calcium and vitamins A and C.

Card 19.

SCALLOPS

A good source of protein.
A good source of phosphorus.
A notable source of calcium and iron.

Card 20.

EGGS

Whole fresh eggs are a good source of proteins, of iron, and unless the diet of the hen has been poor, of vitamins A and D.
They contribute notable amounts of calcium, phosphorus, niacin, and vitamins B_1 and B_2.
The yolk of the egg has all the nutrients mentioned.
The white has none of the minerals in quantities of any consequence, and B_2 is the only vitamin present in significant amounts.
(Stored or preserved eggs lose some of their nutrient value, depending upon the method of storing them.)

Card 21.

MILK
(Whole Raw)

A rich source of calcium.
A good source of protein, phosphorus, and vitamins B_2.
A notable source of iron, niacin, and vitamins A and B_1.
Raw whole milk contains varying amounts of ascorbic acid (vitamin C). Destruction of this by pasteurization varies with the method.

Card 22.

MILK
(Evaporated)

A rich source of calcium.
A good source of protein, phosphorus, and vitamins A and B_2.
A notable source of iron, and vitamins B_1 and C.
Vitamin D content of evaported milk is greatly increased by irradiation. Present values for Vitamin D milk are 135-400 units per quart. Consult labels for information regarding the different brands.

Card 23.

SKIMMED MILK POWDER

A rich source of calcium.
A good source of protein and phosphorus.
A notable source of iron and vitamin B_1.

Card 24.

CHEESE (CREAM)

A good source of vitamin A.
A notable source of protein and phosphorus.

Card 25.

CHEESE (SWISS AND SIMILAR TYPES)

A rich source of calcium.
A good source of protein and phosphorus.
A notable source of vitamins A and B_2.

Card 26.

CHEESE (COTTAGE)

A notable source of protein, calcium, phosphorus, and iron.

Card 27.

BUTTER

A good source of vitamin A.
Contains some vitamin D.
(Values of vitamins A and D vary according to season.)

Card 28.

OLEOMARGARINE

A notable source of vitamin A.
Many brands are now fortified with large amounts of vitamin A (270-300 I.U. per tablespoon). Consult the label for information regarding the enrichment of each brand of oleomargarine.

DISPLAY SET V
Nutrient Value of Cereal Grain Products

Card 1.

BREAD

(Ordinary White)

A notable source of protein.
Contributes a little calcium, phosphorus, iron, and vitamins B_1 and B_2.

Card 2.

BREAD
(White, Enriched)

A notable source of protein, calcium, iron, and vitamins B_1 and B_2.
(Calcium, niacin, and vitamins B_1 and B_2 vary with enrichment. Niacin, iron, and vitamin B_1 have been added to the official enriched bread. Calcium, and vitamins B_2 and D have been suggested as other desirable essentials.)

Card 3.

BREAD
(Whole Wheat)

A notable source of protein, calcium, phosphorus, and iron.
A notable source of vitamin B_1.
Contains some vitamin B_2.

Card 4.

BREAD
(Rye)

A notable source of protein, phosphorus, and iron.
A notable source of vitamin B_1.

Card 5.

BREAD
(Graham)

A notable source of protein.
A notable source of phosphorus and iron.
A notable source of vitamin B_1.
Contributes a little vitamin B_2.

Card 6.

BREAD
(Boston Brown)

A notable source of protein, calcium, phosphorus, and iron.
Also a notable source of vitamin B_1.
Contributes some vitamins A and B_2.

Card 7.

BISCUIT
(Baking Powder)

A notable source of protein, calcium, and phosphorus.
Contributes some iron and vitamins A, B_1, and B_2.

Card 8.

CINNAMON BUN
(with raisins)

A notable source of protein.
A notable source of calcium, phosphorus, and iron.
A notable source of vitamins A and B_2.
Contributes a little vitamin B_1.

Card 9.

CORNBREAD

A notable source of protein, calcium, phosphorus, iron, and vitamins A, B_1, and B_2.

Card 10.

CRACKERS
(Saltines)

Each cracker contributes a little protein, calcium, phosphorus, and iron.

Card 11.

GRIDDLE CAKES
(White, Non-enriched Flour)

A notable source of protein, calcium, phosphorus, and vitamin B_2.
Contributes some iron and vitamins A and B_1.

Card 12.

GRIDDLE CAKES
(Cornmeal)

A notable source of protein, calcium, phosphorus, iron, and vitamin A.
Contributes some vitamins B_1 and B_2.

Card 13.

GRIDDLE CAKES
(Buckwheat)

A notable source of protein, calcium, phosphorus, iron, and vitamin B_1.
Contributes some vitamins A and B_2.

Card 14.

ROLLED OATS (COOKED)

A notable source of protein, calcium, phosphorus, and iron.
A notable source of vitamins B_1 and B_2.

Card 15.

BRAN—BREAKFAST FOOD

A notable source of protein, calcium, and vitamin B_1.
A good source of phosphorus and iron.

Card 16.

CORNFLAKES

Contributes some protein.
Contributes a little calcium, phosphorus, and iron.

Card 17.

YELLOW CORNMEAL (COOKED)

A notable source of protein, phosphorus, iron, and vitamins A and B_1.
Contributes some niacin and vitamin B_2.

Card 18.

PUFFED RICE

Contributes some protein, calcium, phosphorus, and iron.

Card 19.

WHITE RICE (COOKED)

A notable source of protein.
Contributes some calcium, phosphorus, iron, and vitamin B_1.

Card 20.

FRIED MUSH

A notable source of protein, phosphorus, and iron.
A notable source of vitamins A and B_1.
Contributes some niacin and vitamin B_2.

Card 21.

WHOLE WHEAT (COOKED CEREAL)

A good source of iron.
A notable source of protein and phosphorus.
A notable source of niacin and vitamins B_1 and B_2.
Contributes some calcium.

Card 22.

GRAPENUTS

A good source of iron and vitamin B_1.
A notable source of protein.
Contributes some calcium.

Card 23.

HOMINY

A notable source of protein and iron and vitamin B_1.
Contributes some phosphorus.

Card 24.

SHREDDED WHEAT

A good source of iron.
A notable source of protein, phosphorus, and vitamins B_1 and B_2.
Contributes some calcium.

Card 25.

MACARONI AND CHEESE

A good source of calcium and phosphorus.
A notable source of protein, iron, and vitamins A, B_1 and B_2.
(Plain macaroni is a notable source of phosphorus and iron and contributes a little calcium and vitamin B_1.)

Card 26.

SPAGHETTI

A notable source of protein, phosphorus, and iron.
Contributes a little calcium and vitamin B_1.
(With tomato sauce, the calcium and iron values are increased a little; the food becomes a good source of vitamins A and C, a notable source of vitamin B_1, and contributes some vitamin B_2.)

Card 27.

WHEAT GERM

A good source of vitamins B_1 and B_2.
A notable source of protein, phosphorus, iron, and niacin.
Contributes a little calcium and vitamin A.

PUBLICITY FOR THE VICTORY GARDEN PROGRAM

To be fully effective, the Victory Garden program must be known and understood by everybody. It is therefore an essential part of the duties of Victory Garden committees to try to convey information on home food production and conservation to every family in their respective districts. Admittedly it is not within the capacity of volunteer committees to do this and at the same time to discharge their other duties; consequently they must adopt those methods by which most persons may be reached with least effort.

Newspapers, because of popular interest in home gardening, provide the best medium for distribution of information on this subject. Most local newspaper editors are glad to print notices, articles, and news items; many of them conduct a Victory Garden column, and prefer greatly to fill it with items of local interest. Many editors would be glad to have the co-operation of Victory Garden committees in supplying material from local sources, or in adapting copy from state or national sources to local conditions.

National news syndicates, such as United Press and Associated Press, either regularly or occasionally release news on gardening and instructions for home gardeners, but such material is necessarily of very general character. With the co-operation of local Victory Garden committees, general information may be made applicable to local conditions.

As a rule, news items must be timely and must carry the authority necessary for their general acceptance. The better known the authority, the more readily is the information accepted. For this reason, news items are more effective if they are released by local authorities, such as Chairmen of Victory Garden Committees. Furthermore, information must be easily understood and timely.

Examples are shown below of publicity for local newspapers, prepared by the Pennsylvania State Council of Defense Victory Garden Committee for release by state or local Victory Garden Committee officials. Where blanks occur, the name of the proper chairman or committee is to be inserted by the agency releasing the information to the newspaper. The first and third articles are to be released to local newspapers by County or local Victory Garden Committee chairmen; the second is for regional or state release, by the State Victory Garden Committee.

FERTILIZING VICTORY GARDENS

To obtain maximum benefits from fertilizers, Victory gardeners must consider that the root systems of most of their vegetable crops are small and relatively shallow, says ....., Chairman of ..... Victory Garden Committee, quoting an article released to the State Council of Defense by Dr. F. G. Merkle, Professor of Soil Technology of The Pennsylvania State College. For this reason, it is necessary that the top soil be well supplied with available plant food throughout the growing season, to produce vegetables of the size and quality we desire.

To meet this requirement, on a good garden soil—that is, one that is deep, mellow, and well drained but not easily affected by drouths—there are three common needs, lime, manure, and chemical fertilizers.

The majority of the common vegetables require a neutral soil, that is, a soil which is not acid. Fortunately one can readily determine how much lime is needed by simple acidity tests. For those who would like to do their own testing, inexpensive kits are available with which the grower may determine how acid his soil is. Or if he chooses, he may take or send a sample to his county agent or Agricultural Experiment Station. If the soil is found to be acid it will probably require from 75 to 100 pounds of finely ground limestone or a little less hydrated lime to correct this condition on a 50 x 60 foot garden. Since soils which have been acid for some time are prone to be lacking in mellowness, and to be inactive bacteriologically it may require some time to transform them into the condition desired. Hence lime should be applied long in advance of planting. Half the total application may be made at once upon the surface allowing the rains an opportunity to soak it into the ground. The remainder of the application may be applied after digging or plowing. This dual application helps in obtaining complete mixing with the entire top soil.

Quoting further, ... states that manure is "the priceless ingredient" for improving new gardens. "The best treatment to set up an active bacterial growth and to aid in granulating a lumpy soil and make it mellow is rotted cow or horse manure. Old gardens which have been heavily fertilized and manured in the past and which are known to be productive may not need manure yearly. Presumably many Victory gardens will be planted on new ground, ground which has been abandoned or neglected. These are almost certain to require manure for their physical, bacterial and nutritional deficiencies.

Fresh manure, particularly that which contains much straw, is undesirable; it may be the only kind available, however, at this time of year. Manure which has rotted in a pile until it is nearly black is most desirable from a mechanical and bacteriological point of view. Fresh straw is known to encourage soil microorganisms which consume available nitrogen to the detriment of the crop; if such manure is the only kind available, therefore, it should not be applied too heavily.

Poultry manure is more concentrated and more active than stable manure. It produces available nutrients more quickly than stable manure but is not so useful in improving the structure of soils, that is, it acts more like a fertilizer than as a manure. It should be used sparingly or it is likely to burn the tender seedlings. About 100 pounds of poultry manure, spaded in, are sufficient for 1000 square feet of garden.

In addition to lime and manure some fertilizers will be needed for all except those gardens which have been well manured and fertilized for many years previously, continues ..... Certainly new

gardens, and any suspected of being in poor fertility need some chemical fertilizer. The method of applying it deserves consideration. One of the easiest and probably most effective ways is to spread it upon the lime and manure just before digging, and to dig under all three ingredients at one time. If no manure is used then fertilizer and lime may be dug in at one time. About 30 pounds per thousand square feet, i.e., 35 x 30 feet, are generally sufficient. Another way that is quite effective is to open a V-shaped furrow about 3 inches deep and scatter the fertilizer in this furrow without mixing it into the soil. Then open another furrow about three inches to one side of the former and plant the seeds in the fresh soil. In this way the seeds are not in contact with the fertilizer but are close enough to obtain its benefits.

In addition to the treatments described, a little dissolved fertilizer applied at planting time is generally quite beneficial. Starter solutions, to use instead of water in transplanting, may be made by stirring one-fourth pound of Victory 5-10-5 in a gallon of water and pouring a half pint of this solution on the roots, just before they are covered with soil, when transplanting tomatoes, cabbage, peppers, etc. The dissolved fertilizer helps the plants to overcome the shock of transplanting. A starter solution about half as strong as the above may be used to moisten the ground around seeds in the drill row. It is simply poured on the seeds, allowed to soak into the soil, and then the proper amount of soil is drawn over the seeds.

IRRIGATING VICTORY GARDENS

Victory Gardeners concerned over the amount of water needed by their early vegetables were advised by the State Council of Defense Victory Garden Committee today that moisture already in the ground is probably sufficient for the present.

"There was more than average precipitation in Pennsylvania during late April," said Dr. Warren B. Mack, executive secretary of the committee. "Consequently, the moisture supply is probably sufficient at present if the ground was properly prepared."

Dr. Mack warned against "running out to the garden every evening and emptying a few sprinkling-cans of water." This amount of water is worse than none, he said, because it puddles the soil surface and forms a hard crust that hinders the absorption of later rainfall.

"During dry weather, gardens may be watered about once a week, if an adequate supply of water is available, or at this season about every ten days," said Dr. Mack. "They should be watered thoroughly if at all. The equivalent of nearly one inch of rain, or about one gallon of water to each one and two-thirds square feet, is recommended."

He emphasized the importance of shallow cultivation with hoe or scraper to keep the weeds down, explaining that weeds compete very seriously with vegetables for the available moisture.

There still is ample time to plant gardens in Pennsylvania, Dr. Mack said. Tender crops such as corn, beans, cucumbers, melons, and transplants may be planted now in southeastern counties and still later in other areas of the state.

PLAN FOR A CONTINUOUS VEGETABLE SUPPLY

The Victory Garden should be planned in such a way that it will provide fresh vegetables all season long . . . not an over-abundance in early summer, followed by scarcity the rest of the summer and fall.

This advice was given today in a statement released by ...., chairman of the Victory Garden Committee of the .... County Council of Defense.

"Some crops, like Swiss chard, will remain in good condition all season and only one sowing need be made to produce a continual supply," the statement said. "On the other hand, early radishes mature in about four weeks and in another week are too pithy to eat.

"If you sow more than a week's supply of radishes at one time, the rest will be wasted. This applies to other short-season crops also, except when an extra amount is planted especially for canning purposes.

"How can you determine the amount of each vegetable to plant for use while fresh? The accompanying table (at end of article) lists these short-season crops. Column 2 gives the space in a garden row required to produce sufficient to make one serving to a family of four; column 1, the time which the harvest from one sowing will last.

"To determine the longest row of one vegetable to sow at a time, estimate the number of times your family will eat it during the period of harvest given in column 1. Multiply this by the number of feet in the garden row required for one serving, as given in column 2.

"Take, for example, beets. The period of best harvest from one planting is six weeks. How often will you serve beets in that period? Remember, three vegetable dishes a day should be the minimum next summer, which means 21 family servings a week. Three servings a week, then, will be almost the minimum for any vegetable. At this rate, in six weeks you will need 18 servings of beets. Multiply 18 by one foot, the space in the row needed for one family serving, and you have 18 feet, the maximum row that you should sow at one time for use while fresh.

"To allow for guests, and possible mishaps which may reduce your crop, sow 20 feet. Make two or three sowings, spaced about like this:

Seven weeks between the first and second, five weeks between the second and third, because the second sowing will grow faster than the first and the third slower. The later sowings should make allowance for canning needs.

"Go right through the list of the short-season vegetables with this kind of calculation. If your soil is not rich, give a little more space than the table calls for, and make liberal allowances for extra food for friends and guests.

"Food for canning, drying, or storage must be figured in addition to the summer's supply for the family table."

Crop	Column 1 Period of Harvest	Column 2 Length of row for 1 family serving
Beans, snap	4 weeks	1 foot
Beets	6 weeks	1 foot
Carrots	8 weeks	2 feet
Cucumbers	4 weeks	2 feet
Endive	6 weeks	1 foot
Lettuce	6 weeks	1 foot
Kohlrabi	3 weeks	2 feet
Turnips	2 weeks	1½ feet
Spinach	2 weeks	3 feet
Sweet corn	10 days	5 feet
Onion sets	4 weeks	1 foot
Peas	2 weeks	5 feet
Radish, early	1 week	1 foot
summer	2 weeks	1 foot
winter	6 weeks	1 foot